

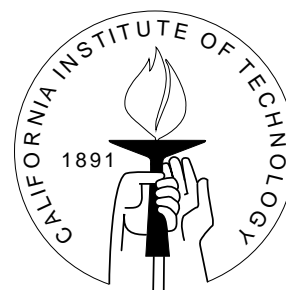
DIVISION OF THE HUMANITIES AND SOCIAL SCIENCES

# **CALIFORNIA INSTITUTE OF TECHNOLOGY**

PASADENA, CALIFORNIA 91125

## FINANCIAL SYSTEM STRUCTURE AND INDUSTRIALIZATION: REASSESSING THE GERMAN EXPERIENCE BEFORE WORLD WAR I

Caroline Fohlin



**SOCIAL SCIENCE WORKING PAPER 1028**

May 1998

# **Financial System Structure and Industrialization: Reassessing the German Experience before World War I**

Caroline Fohlin

## **Abstract**

Lack of both theoretical cogency and empirical evidence casts doubt on the Gerschenkronian paradigm of banking and industrial development. Social, political, and regulatory environments may shape financial systems, and institutions may persist beyond their usefulness. Central features of universal banking arose late in the German industrialization, if at all; those that did may not have stemmed from the banks' universal structure. In focusing on international differences among financial systems, traditional views on the relative benefits of universal banking may underestimate both the impact of non-institutional factors on development experiences and the similarities in the ultimate effects of disparate systems.

Key words: financial intermediation, universal banking, relationship banking

# Financial System Structure and Industrialization: Reassessing the German Experience before World War I

Caroline Fohlin\*

Universal banking has long provoked a great deal of interest among economic historians, particularly in the context of Germany from the beginning of the Second Reich to the end of the Third. Banks are seen as part and parcel of the industrialization of many economies, but nowhere more than that of Germany. Likewise, among modern economists, the German banking system has attracted significant attention, especially in connection with questions about the optimal design of financial and corporate governance systems. Economics research on modern universal banking understandably reflects current themes in regulatory debates in the United States, negotiations over European unification, and efforts toward industrial development in many regions of the world. Just as naturally, but also in contrast, the historical literature tends to focus on the power and importance of specific individuals and institutions.

Motivating this paper is the sense that economists, historians, and economic historians all stand to gain from more extensive linking between the theoretical literature on financial institutions and the historical literature on the German experience. Therefore, this paper explores both modern theories and historical studies and, in the process, ties together a wide range of research on universal banking. Combining the models and methods of economics and history can raise new questions and help restructure unresolved debates about financial systems and their possible role in economic growth. Thus, this study also offers an agenda for future research on German universal banking.

The recent theoretical literature emphasizes the role of financial institutions in resolving uncertainty through the revelation and intermediation of information about individual firms as well as in balancing and diversifying risks that remain even when firms and potential investors are symmetrically informed. These fundamental tenets of financial theory provide a framework for new lines of inquiry: for example, whether certain

---

\*I am grateful to David Soskice (Wissenschaftszentrum Berlin) and Martin Hellwig (the University of Mannheim) for their kind hospitality and to Lance Davis, John Latting, and Larry Neal for helpful comments and discussions. Financial support from the National Science Foundation and from the Fulbright Commission is acknowledged with thanks.

types of financial institutions gather and disseminate information more effectively than others, whether close ties between firms and banks resolve information asymmetries and alter firms' decision making, or whether universal banking systems encourage superior risk management compared with market-oriented systems. The answers to such questions will illuminate both the historical experience and potentially also the problems of modern growth and development.

Historical investigation, in turn, offers a long-term view of the evolution of systems and provides an expansive testing ground for financial theories. The German case in particular, because of the significant systemic changes and repeated shocks its financial system has suffered over the past 150 years, offers a potential wealth of experience to inform and help refine theories of financial system structure and firm decision making.

The paper begins with an overview of the traditional conception of German universal banking during industrialization (section two) and then moves to a discussion of recent work on financial intermediation and related theoretical literature (section three). The fourth section poses new lines of research based both on restructuring traditional debates around modern banking and finance theory and raising new questions not often addressed in the previous literature. The paper argues that social, political, and regulatory environments may play key roles in shaping financial systems and that institutions may become entrenched and outlive their usefulness. Moreover, the paper suggests that many of the purportedly beneficial practices of the German banks took place only to a limited extent during industrialization; and those that did may have had little to do with the banks' universal structure. The paper concludes that in focusing on international differences among financial systems, widely-held beliefs about the relative benefits of German-style universal banking may underestimate both the impact of non-institutional factors on development experiences and the similarities in the ultimate effects of disparate systems.

## II. TRADITIONAL VIEWS ON GERMAN UNIVERSAL BANKING BEFORE WORLD WAR I

This section sets out the orthodox view on the role of the universal banks in German industrial development between 1870 and 1914. Rather than review the development of institutional structure, and the possible legal impetuses for such change, this paper focuses on the presumed economic effects of the universal structure and accompanying corporate governance practices.<sup>1</sup> Issues of timing and institutional change are important and receive attention in the latter two parts of the section. These subsections sketch the principle debates that punctuate the historical literature and raise some logical inconsistencies and empirical problems with the traditional lines of research. It is unclear just how widespread the orthodox view of German banking and industrialization remains: traditional views persist in recent research in the area, though significant reevaluations also appear.

---

<sup>1</sup>For outlines of historical developments and changing organization, see Tilly (1967), Fohlin (1994), Hauswald (1995), and DaRin (1995).

### *A. The Gerschenkron-inspired paradigm*

Universal banks have been acknowledged since the nineteenth century for the part they played in Germany's industrialization. Many authors have written on the subject; but Gerschenkron's work, perhaps because of its simplification of the myriad complex issues, has appealed to a particularly wide range of economists and historians, especially in the United States and Great Britain. Though many speak of the 'Gerschenkron Hypothesis,' however, such an hypothesis is difficult to pinpoint or operationalize.

In part, the so-called Gerschenkron hypothesis holds that the role of financial institutions in industrialization relates to the extent of 'economic backwardness' on the eve of industrial takeoff.<sup>2</sup> According to his schema, financial institutions played a critical role in the industrialization of 'moderately backward' economies—meaning much of northwestern continental Europe. In situations of extreme underdevelopment, as in Russia, financial institutions were insufficient to support the transition to modernized industrial activity. Such cases demanded supplementary, centralized institutional intervention, mostly from government.

But the importance of financial institutions comprises only part of Gerschenkron's overall thesis; he saw banking as one factor in many that varied with general economic conditions. Gerschenkron (1970) summarized those conditions thus: "what was found to vary in direct relation to the degree of backwardness were: 1) the speed of industrial growth; 2) the stress on bigness of plant and enterprise; 3) the composition of the nascent output, that is, the degree to which 'heavy' industries were favored; 4) the reliance on technological borrowing and perhaps financial assistance from abroad; 5) the pressure on levels of consumption; 6) the passive role of agriculture; 7) the role of banks and state budgets; 8) the virulence of ideologies, under the auspices of which the industrialization proceeded."<sup>3</sup>

Because of its ability to adopt technologies developed in already-industrialized Britain, Germany is argued to have arrived faster at modernization than had its role model. Yet the scale of factories and firms needed to compete was so large as to require investment from beyond the typical entrepreneur's circle of family and associates. This relative capital shortage is thought to have necessitated institutions capable of mobilizing a high volume of resources from disparate sources and also able to compensate for a shortage of entrepreneurship. The universal banks are traditionally viewed as just such an institution:

"The German investment banks a powerful invention, comparable in economic effect to that of the steam engine were in their capital-supplying functions a substitute for the insufficiency of the previously created wealth willingly placed at the disposal of entrepreneurs. But they were also a substitute for entrepreneurial deficiencies."<sup>4</sup>

---

<sup>2</sup>Gerschenkron (1962, 1970). Sylla (1991) gives a nice retrospective on Gerschenkron's theories and some related work.

<sup>3</sup>Gerschenkron (1970), p. 98-9.

<sup>4</sup>Gerschenkron (1968), p. 137, cited in Collins (1998).

Though only one piece of his overall paradigm, Gerschenkron clearly depicts the universal banks as an intricate part of the industrialization process; and he is not alone. Many economic historians believe that the universal banks provided the underpinnings, and were even a necessary and sufficient condition, for the German industrialization. Qualifications of the role of the banks have been surfacing for some time, yet the consensus remains on the side of the banks.<sup>5</sup> The orthodox view of universal banking, whether truly attributable to Gerschenkron or not, credits these institutions with contributing in many ways to the growth of German industry. At the most fundamental level, the universal banks are thought to have mobilized the financial resources that made industrialization possible. As Chandler explains, "...these banks provided initial capital for new industrial ventures and helped guide them through their early years of growth...They supplied much of what today would be called venture capital."<sup>6</sup>

Such views largely originate in the literature of the late nineteenth and early twentieth centuries, for example in the well-known writings of Werner Sombart: "Doubtless, a good portion of the increase in economic life in Germany is attributable to this interest of the banks and bankers in productive, economic activities. The banks have become the direct promoters of the spirit of enterprise, the pacemakers for industry and trade."<sup>7</sup> The sentiment of Sombart (1909) was widely shared by his contemporaries and finds continued support among modern economists and historians.

Kennedy (1987) exemplifies such thinking: "Germany and America were compensated for their deficiencies in short-term and high-grade securities markets, however, by a superior ability to concentrate resources in areas strategic for rapid development at moments crucial to the evolution of new products and techniques...The German banking system, therefore, provided much more elaborate formal facilities for concentrating financial resources than either the U.S. or British counterparts."<sup>8</sup> He goes on to attribute apparently superior growth performance in Germany (and the U.S.) to differences in financial structure: "...capital markets in the U.S. and Germany, by making resources available to a large group of technologically progressive industries on a scale unequalled in Britain, account for much of the difference in the economic growth performance between those two countries and Britain in the half century after 1865."<sup>9</sup>

Similar views on German banking also emerged much earlier. Thus, Lavington (1921) stressed screening, monitoring, risk management, venture capital activities and economies of scale and scope: "An organization of this kind, intermediate between the sources of enterprise and the sources of capital, must evidently possess machinery for investigating business ventures, financial strength adequate to sustain the heavy risks to which it is

---

<sup>5</sup>See, for example, Calomiris (1995) or Tilly (1994). Subsequent sections discuss ongoing debates and doubts further.

<sup>6</sup>Chandler (1990), p. 417-419.

<sup>7</sup>Sombart (1909), p. 203, author's translation. For a thorough bibliography of contemporary literature, primarily in German, see Riesser (1910 [German original], 1911[English translation]). Whale's (1930) bibliography is a useful supplement and covers later works.

<sup>8</sup>Kennedy (1987), p. 116. See also Chandler (1990), p. 417-419.

<sup>9</sup>Kennedy (1987), p. 120.

exposed and the reputation and business connexions necessary for the efficient sale of securities to the public. An organization such as the Deutsche Bank possesses these qualities to a high degree...It is easy to see that, with able management and machinery of this kind, the risks of industrial banking are greatly reduced; business ventures in need of capital can be thoroughly investigated and the development of the more pioneering enterprises may be promoted with a reasonable prospect of success.”<sup>10</sup>

The German banks are thought to have developed special characteristics that in part emulated but that also inspired financial systems of neighboring countries. Such institutional features involved both the structure of the banks and the policies pursued by them. The orthodox paradigm, albeit not always in these terms, credits the universal banks with mobilizing capital through large networks of branches, screening potential entrepreneurs, promoting and re-organizing whole industries, deciding on investment and production strategies, monitoring the progress of clients' investments, arranging and enforcing propitious industrial combinations, and diversifying away the risk associated with such innovative activities.

The universal banks' combination of the full range of financial services is thought by many to have given German bankers advantages in providing substantial and efficient finance throughout firms' lives. Such efficiency has been argued in turn to have reduced the costs of finance and thus promoted industrial investment.<sup>11</sup> In a related vein, the German banks have been credited with promoting efficient allocation of the economy's investment portfolio, particularly in comparison with Britain.<sup>12</sup>

Efficiency gains hinge not just on the reusability of information but on its quality as well. Thus, close, long-term relationships between banks and industrial firms are seen as central to the banks' acquisition and transfer of useful information—not just financial, but also strategic and entrepreneurial. Moreover, the banks are thought to have gained significant say in the use of funds, and thus the types of investments made by firms. Such involvement and oversight is argued to have reduced banks' uncertainty about borrowers, mitigated risks of moral hazard or simple bad judgement, and facilitated long-term lending. Long-term bank lending usually took the form of short-term credits on current account that were rolled over repeatedly. Pollard and Ziegler (1992) sum up the widely-accepted view “that the rolling short-term credit, perpetually renewed, could be the equivalent of long-term capital, or could be used to free the firm's resources for long-term investments.”<sup>13</sup>

---

<sup>10</sup>Lavington (1921), p. 210.

<sup>11</sup>Economies of scope is a modern interpretation of the traditional accounts. Calomiris (1995), for example, advances such an argument and has argued that German companies faced lower costs of issuing new equity compared with their American counterparts. Tilly (1994) produces similar figures for Germany.

<sup>12</sup>This research, Tilly (1986) and Kennedy and Britton (1985), is discussed subsequently at greater length.

<sup>13</sup>Pollard and Ziegler (1992), p. 21.

Formalized relationships between banks and firms, perhaps even more than universal banking functions themselves, attracts ample praise in the historical literature. Gerschenkron, among others, claimed that “the German banks, and with them the Austrian and Italian banks, established the closest possible relations with industrial enterprises.”<sup>14</sup> Formal ties between banks and firms were established and maintained through placement of bank representatives on firms’ supervisory boards (*Aufsichtsrat*).<sup>15</sup>

Jeidels (1905) claimed that “...the power of the Great Banks is exercised via the legal institution of the supervisory board, rather than through direct influence of financial strength.”<sup>16</sup> Gerschenkron echoed Jeidels, saying that “...through development of the institution of the supervisory boards to the position of most powerful organs within corporate organizations, the banks acquired a formidable degree of ascendancy over industrial enterprises, which extended far beyond the sphere of financial control into that of entrepreneurial and managerial decisions.”<sup>17</sup>

Thus, bank seats on supervisory boards are traditionally thought to have permitted not just oversight, but also direct control, over firms’ operations and decisions. Chandler (1991) notes, “The representatives of the German Grossbanken participated to a greater extent in the top-level decision-making of new industrial companies than did representatives of financial institutions in the United States and Britain.” He goes on to report that “...the banks often had a significant say (particularly in the early years of a company’s history) in investment decisions, in the selection of top and even middle managers, in establishing administrative procedures, and in reviewing the internal financial management of the enterprises that they had helped to finance.”

For individual firms and whole industries, bank intervention is seen as improving operational efficiency, managerial organization, and, ultimately, profitability. In this connection, the universal banks are often also characterized as marriage brokers: identifying advantageous combinations, in the form of cartels or mergers. As Feldenkirchen (1991) describes, noting the difficulty of enforcing output and pricing agreements during the 1880’s, “the banks, with the Disconto-Gesellschaft in the lead, promoted the expansion of big enterprises such as the Gelsenkirchener Bergwerks AG and the Harpener Bergbau AG, expecting to achieve their aims more easily once industrial concentration had taken place.”<sup>18</sup>

---

<sup>14</sup>Gerschenkron (1962), p. 14. Jeidels (1905), Riesser (1910), Schumpeter (1930), Wallich (1905), Whale (1930), Tilly (1994), Chandler (1990), and most others writing on the subject, also emphasize this point.

<sup>15</sup>German joint-stock firms are governed by two boards. The supervisory board is elected by and represents shareholders and also appoints the firm’s executive board. The latter, comprising firm managers, oversees day-to-day operations. Most other types of companies are not required to have a supervisory board.

<sup>16</sup>Jeidels (1905), p. 145, author’s translation. The Great Banks were the 9 largest of the universal banks: Bank für Handel und Industrie, Berliner Handelsgesellschaft, Commerz- und Discontobank, Deutsche Bank, Discontogesellschaft, Dresdner Bank, Mitteldeutsche Creditbank, Nationalbank für Deutschland, and A. Schaaffhausen’scher Bankverein.

<sup>17</sup>Gerschenkron (1962).

<sup>18</sup>Feldenkirchen (1991), p. 127 and references cited there.



One further advantage often attributed to the universal banking system, and to formal bank-firm relationships in particular, is the willingness of bankers to help firms solve idiosyncratic difficulties and ride out general downturns. Feldenkirchen (1991) gives the example of Hoerder Bergwerks-und Hüttenverein, which, because of its exclusive relationship with the Schaaffhausen'schen Bankverein (and the private banker Deichmann & Co.), received crucial restructuring and survived a brush with bankruptcy.<sup>19</sup> More generally, the conventional view of German universal banking emphasizes the cradle-to-grave relationships between banks and firms and the beneficial mutual commitment that resulted. Jeidels (1905) commented, from the banks' perspective, that it was "in the interest of the security, profitability, and longevity of a credit institution to provide for all of the credit needs of a firm, from its formation to its liquidation."<sup>20</sup>

Thus, taken in its entirety, the traditional paradigm holds that universal banking activities and accompanying formalized bank-firm relationships raised the quantity, quality, and efficiency of investment in the latter half of the nineteenth century and the start of the twentieth. Inherent in this view of German finance and industrialization is a comparison with other countries, and Britain attracts particular attention. England, being seen as the first European country to industrialize, constitutes the metric by which other experiences are measured. In the Gerschenkronian account, British industrial development proceeded in a gradual enough manner, and innovations required small enough infusions of capital, that entrepreneurs depended little on external financing from banks.<sup>21</sup> The standard view of banking and industrialization, then, distinguishes sharply between the British and German experiences.

There is a second part to the Anglo-German comparison; involving the relative success of the two banking systems in promoting industrial growth at the end of the nineteenth century and the start of the twentieth. Though such notions are currently debated, Britain is traditionally thought to have lost ground relative to its continental neighbors at the turn of the century, and this relative slowdown is often attributed to a failure to innovate and invest at the forefront of technology. Noting Germany's significant advantage over Britain in world exports of chemicals, electrical equipment, and industrial machinery, Chandler concludes, "these figures emphasize that although Britain was holding its own in traditional industrial goods and materials, textiles, iron shapes, iron ships, and steam engines Germany had decisively outpaced Britain in producing and exporting the products of the Second Industrial Revolution."<sup>22</sup>

The British financial system has received harsh and repeated criticism for much of the past century, and much of what is seen as the decline of the British economy has

---

<sup>19</sup>Feldenkirchen (1991), p. 127.

<sup>20</sup>Jeidels (1905), p. 63, author's translation. See also Gerschenkron (1962) and, for a modern restatement, Mayer (1988).

<sup>21</sup>Some question the standard view. See, for example, Cottrell (1980), Mathias (1973, 1989), and Cameron (1967, 1972).

<sup>22</sup>Chandler (1990), p. 410-11. See this same work for in-depth discussion of British, American, and German forms of industrial organization. On relative productivity of Britain and Germany, see Broadberry (1997).

been blamed on the failure of financial institutions. British industry is thought to have been constrained by a lack of capital; the banks, it is argued, could have, but refused to, provide necessary finance to industry. Many have chastised the British banks for avoiding engagement with domestic industry and leaving firms to find finance from other sources. The banks' involvement in foreign and imperial ventures is claimed to have drained away funds from domestic industry; firms' resultant recourse to securities markets is argued to have advanced investors' short-term profit motives at the expense of long-term growth.<sup>23</sup>

Thus, the German banks are thought not only to have engaged in all of the activities seen as central to the promotion of economic growth, but to have executed these functions more effectively and efficiently than the British banks. In echoing the common perception that the British banks and securities markets heavily favored short-term and gilt-edged instruments, Kennedy (1987) attributes the lack of long-term lending and venture capital to the 'informational weaknesses' of the British system. In a paper previously mentioned, Kennedy and Britton argued moreover that the German system's superior risk diversification placed that country closer to its efficient portfolio frontier compared to Britain. Kennedy concludes that "What was unique in Britain was not the existence of imperfect sharing of risk and control among those with a stake in corporate ventures but rather the unusually slow development of recognition of the extent of the problem and of effective means to rectify it."<sup>24</sup>

Yet more recent research has begun to undermine the sharp distinction between the operations of the British deposit banks and the German universal banks, particularly in the realm of commercial lending. Collins (1998), for example, argues convincingly that the English banks offered much more long-term finance through rolled over credits than previously thought and suggests that the English banks discriminated less among customers compared to the lending practices of bank-industry groups (*Konzern*) in Germany. Moreover, it seems that British bankers did provide significant oversight functions and also aided distressed firms with which the banks maintained long-term relationships.<sup>25</sup> Nonetheless, a significant contingent still holds that the British system promoted short-termism and less efficient distributions of risk compared to Germany.<sup>26</sup>

### *B. Traditional areas of debate in the historical literature*

The orthodox view of banking and industrial development, though enduring, has not gone unchallenged. Indeed, the German universal banks, since their origination in the middle of the nineteenth century, have engendered copious discussion and debate among academics, practitioners, and politicians. Strong views of both positive and negative sorts persist.

---

<sup>23</sup>For a review of the literature on British banking and industrial development, see Michael Collins (1991, 1998). Also see Forrest Capie and Collins (1992). For a critical appraisal of the British banking system, see George Edwards (1987).

<sup>24</sup>Kennedy (1987), p. 127.

<sup>25</sup>Watson (1995) also argues, based on financing of the beer brewing industry, that criticism of the British banks is exaggerated.

<sup>26</sup>This position is stated in Tilly (1994), p. 4.

Recent work challenges Gerschenkron's hypothesis at the broadest level. The orthodox view, as it is now recognized, underemphasizes the role of political and legal factors in the development of financial systems. As Tilly (1994) notes, the Bubble Act of 1720 and the monopoly of the Bank of England over limited liability banking until 1825 kept the British banks smaller and more conservative than they likely would have been based only on demands for industrial finance. Moreover, the lack of dependable lender of last resort facilities reenforced the reluctance of bankers to engage in risky transformation of short-term liabilities to potentially illiquid assets (Ziegler, 1993, Kennedy, 1992). The German Reichsbank, in contrast, both squeezed other banks out of much of the short-term commercial business and facilitated those banks' provision of riskier investment services. Moreover, regulation of securities markets and joint-stock companies seems to have encouraged the dependence on and expansion of the universal banking system in Germany.

Verdier (1997) generalizes such critiques and takes direct aim at Gerschenkron's hypothesis about the relationship between the extent of economic backwardness and the role of financial institutions. He argues that political structure, not relative backwardness, determines the shape of financial systems. As Verdier concedes, though, political centralization was neither solitary nor decisive in determining financial structure in most cases. Furthermore, political structure is not clearly independent of economic backwardness, and the two factors may be mutually enhancing, rather than mutually exclusive. Thus, the Verdier thesis, whether it correctly characterizes the relationship between political and financial development, does not clearly subvert Gerschenkron's hypothesis. Nonetheless, this line of work raises the potential importance of political and legal factors in influencing the link between financial structure and economic progress.<sup>27</sup>

Most debates in this area focus more directly on the connection between financial institutions and industrial development. In this vein, perhaps most damaging to the orthodox view of universal banking's role in the industrialization of continental Europe is the criticism that this form of banking often developed after the first push of industrialization. This point may be particularly serious for the German case. Since German state governments tightly restricted the formation of joint-stock companies until 1870, few companies organized themselves under this form during the first wave of industrialization in the late 1830s and 1840s or even during the first big push of heavy industry in the Ruhr (1850s).<sup>28</sup> Moreover, the first joint-stock universal banks arose in 1848 and then in the 1850s, so that they could not have played any role in the significant steps toward industrialization taken in the first half of the nineteenth century.<sup>29</sup>

To counter the anachronism critique, researchers have pointed to Tilly's (1966, 1967, 1986) work showing that the private bankers of the Rhineland began to develop uni-

---

<sup>27</sup>For more on legal issues, see the edited volume by Horn and Kocka (1979) especially those by Horn, Friedrich, and Reich.

<sup>28</sup>See Böesselman (1939) and Thieme (1960) on joint-stock companies in Germany.

<sup>29</sup>Cameron (1972) and Edwards and Ogilvie (1996) make the more general point about the timing of industrialization and the development of joint-stock banking.

versal banking techniques as early as the 1830s. The activities and involvement of private bankers varied considerably, however, with most concentrating their resources on government finance and safer investments.<sup>30</sup> As Feldenkirchen notes, German financial institutions developed slowly: “Indeed in hardly any other field of the German economy in the mid-1850s was there such a general degree of backwardness as in the banking sector.”<sup>31</sup> Thus, it appears that much of the financing of the first wave of industrialization flowed, not through universal financial intermediaries, but from the personal savings of entrepreneurs, their families and friends.<sup>32</sup>

The debate over the timing of industrialization and the development of the banking sector raises another potential problem for the Gerschenkron school: geographic and sectoral heterogeneity within Germany. The orthodox view of German industrialization derives largely from the experiences of the Rhineland and Westphalia and of heavy industry and, much later, electro-technical. It is thought that the first wave of industrialization sprang largely from the advent of railroads; and investment in this sector is seen as producing growth-enhancing spillovers in input sectors (mining and metal products) as well as in industries that could benefit from improved transport. Railroad companies themselves soaked up almost three quarters of all capital invested in Prussian joint-stock companies prior to 1870.<sup>33</sup> While banks played a significant role in early railroad financing in parts of Prussia and Saxony, however, state governments financed the vast majority of such investment in other areas.<sup>34</sup>

Furthermore, industrial production began much earlier in Germany than the standard view supposes; and much of the industrial growth of the first half of the nineteenth century derived from small- and medium-sized producers in metal working, textiles, and other light industries.<sup>35</sup> Such industries spread throughout what became the pre-World War I German Empire, while mining naturally concentrated in a narrow swath of middle-Germany: primarily the Ruhr, Saxony, and Silesia (now part of Poland). In many regions, small-scale industry was tied closely to agriculture, and factory production evolved only slowly.<sup>36</sup> Clearly, industrial development varied considerably among the German regions, but proponents of the orthodox view might insist that the universal banks and their principle clientele comprised such a crucial segment of the economy that they still provided the underpinnings of the industrial revolution: in Kindleberger’s view, that “the great

---

<sup>30</sup>See Kocka (1978), Donaubauer (1988), as well as studies cited in those works.

<sup>31</sup>Feldenkirchen (1991), p. 119.

<sup>32</sup>Kocka (1978), p. 538.

<sup>33</sup>Figures estimated by Tilly (1976), p. 588. But, of course, joint stock capital grew much faster after 1870 than before.

<sup>34</sup>Borchardt (1968) estimates government investments at nearly three quarters of railroad finance before 1850.

<sup>35</sup>See Fischer (1968) and Hans Pohl (1986).

<sup>36</sup>On regional differences, see Herrigel (1996) and the many case studies cited there. Fremdling and Tilly (1979) and the paper by Megerle in that volume are particularly informative. For a more general view of regional differences in Europe, see Pollard (1979).

banks constituted less than a tenth of the total assets of financial institutions...but were found at the critical margin affecting economic growth.”<sup>37</sup>

Yet the focus of the universal banks on a narrow range of industries has also prompted debate over the overall effects of the banks on economic growth and the suggestion that this effect, contrary to Kindleberger’s intention, may actually have been unfavorable. Indeed, in an econometric model of the German macroeconomy between 1883 and 1913, Neuberger and Stokes (1974) found a negative relationship between the extent of bank current account lending and German economic growth. The paper sparked some controversy, and debates over its methodology ended without a firm conclusion for or against the growth distortion hypothesis.<sup>38</sup>

Debates have spread even to the orthodox views of relations between large firms and banks in the later stages of industrialization. One part of the traditional paradigm holds that the universal banks exploited their positions of power to manipulate and control industrial firms to the banks’ advantage.<sup>39</sup> As Tilly (1994) concludes, “the ‘facts’ of financial control of industry also seem clear. That investment and mixed banks of the Belgian, French or German and Austrian type consciously and actively pursued the goal of controlling the railroads and industrial enterprises they financed is documented in hundreds of individual episodes.”<sup>40</sup>

Opponents denounce the universal banks for wielding excessive power over industrial enterprises and using their positions to enforce unwanted takeovers and collusive agreements. These same traditions of control, however, because they forced the rationalization of industrial structure, are seen in some quarters as a benefit of German-style banking. As James describes, Gerschenkron claimed that the banks “used their influence on supervisory boards (Aufsichtsräte) to influence firms’ policies and especially to regulate competition and promote cartels and mergers.”<sup>41</sup> The newer consensus opinion now seems to hold that the banks were losing their grip on industry by 1900. Yet this is just when the concentration movement was gathering steam in Germany. Thus, it is difficult to reconcile the idea of bank manipulation of industrial structure with the actual timing of events.

Moreover, researchers have uncovered little evidence in support of the bank-power hypothesis for the pre-war period. Critics refer to the mining and smelting concern Phoenix, a company thought to have been forced into cartelization and merger by bankers sitting on the company supervisory board, as a prime example of bank power.<sup>42</sup> Wellhöner’s (1989) recent research, however, overturns the standard view with respect to the Phoenix

---

<sup>37</sup>Kindleberger (1984), p. 129, quoted in Edwards and Ogilvie (1996). So far, no general evidence exists to support Kindleberger’s claim.

<sup>38</sup>See Fremdling and Tilly (1976) and Komlos (1978).

<sup>39</sup>Hilferding (1910) energetically promoted such an idea.

<sup>40</sup>Tilly (1994), p. 4, citing also Cameron (1961), Levy-Leboyer (1964), Tilly (1966), März (1968), Kocka (1978), and Pohl (1982).

<sup>41</sup>James (1992), p. 263.

<sup>42</sup>See Feldenkirchen (1979) and Kunze (1926). Both are cited in Wellhöner (1989).

case and casts doubt on the bank dominance hypothesis for heavy industry more generally.

Though bankers did use their votes on the Phoenix supervisory board to force the company into the Steelworks Association (*Stahlwerksverband*) against the wishes of the firms' top managers, the banks did so under pressure from other firms in the Association. The banks, one of which was a great bank, acted as a lever for the competitors of Phoenix with the powerful industrialist Thyssen in the lead. Similar events surrounded the fusion of Phoenix with a number of other mining and metal firms in the decade before World War I.<sup>43</sup>

Feldman's work also demonstrates that industrialists, notably Hugo Stinnes, played a major role in initiating mergers and acquisitions and even had to pull the bankers together at times.<sup>44</sup> Banks may have attempted to use their positions to extract rents from their clients, but industrialists could often fight back and exert their independence. Indeed, in many cases, it seems the banks' primary motivation lay in their competition with one another. A telling example may be Stinnes' attempts to secure financing for the acquisition of Dortmunder Union by his firm, Deutsch-Luxemburg, in 1910. The chief difficulty seems to have been the banks' haggling with one another over their shares in the underwriting consortium. Feldman (1997) quotes from Stinnes' wife's diary: "Hugo tries to get the D-Banks under one roof with regard to the fusion of the Union and Deutsch-Luxemburg, so far without success, even if they are coming closer. No one is willing to allow the other a little bit more. Schoeller does not want to let himself be put into a minority by the others, while the Deutsche and Dresdner Banks believe that the Disconto is making too much on the business anyway."<sup>45</sup>

Wessel (1990) and Broder and Wengenroth (1991) also support the idea that bank power was waning (at least in the steel industry), and that especially large firms were largely independent of the universal banks, well before 1900.<sup>46</sup> Most of the research on bank power has focused on the mining and steel sectors, and probably for good reason. If bank power was exerted through their positions on firm supervisory boards, then it is clear that the influence of the largest banks was confined primarily to the mining, transport, and electro-technical industries.<sup>47</sup> Moreover, since there were few joint-stock companies to control before 1870, and since half of the great banks were founded after 1870, it seems that the era of bank domination if it ever existed lasted only two decades.

---

<sup>43</sup>Wellöner (1989), pp. 83-87.

<sup>44</sup>See Feldman (1997), p. 7.

<sup>45</sup>Feldman (1997), pp. 7-8, quoting Stinnes' wife's diary of August 6, 1910. See also Feldman (1998, forthcoming). The D-banks were the four largest great banks: Discontogesellschaft and Dresdner, Deutsche, and Darmstädter Banks.

<sup>46</sup>See also Wengenroth's (1986) comparative study of technological progress and strategy in the British and German steel industry from 1865 to 1895.

<sup>47</sup>Fohlin (1997a) gives the sectoral breakdown of all kinds of bank board positions, and of interlocking directorates more generally, for a random sample of all joint-stock companies in Germany as of 1905. Sombart (1909) reports on all seats of the great banks the findings are also summarized in Fohlin (1997a).

Certainly between the largest banks and firms, power flowed in both directions. Yet this line of historical research has not yet determined how well these prominent counterexamples to claims of bank power generalize to the larger population. Thus, while the traditional views clearly overstate the imbalance between banks and firms, more research is needed to determine the extent of bank influence more broadly. If the paradigm fits poorly in the heavy industrial sectors, though, it probably fits even less well among the sectors that were paid little attention by the great banks. Provincial banks covered much of the geographical and industrial territory ignored by the big Berlin banks, however, and researchers have tended to neglect that segment of the banking sector. Nonetheless, Kocka's conclusion, that "the banks acted like large flywheels; they did not initiate most changes, but, rather, reflected and strengthened existing trends," so far seems warranted.<sup>48</sup>

### *C. Difficulties in the Gerschenkron-inspired paradigm*

Existing debates over universal banking, though certainly of importance, have not usually been structured in a manner that allows us to draw general principles or lessons from them. With this goal in mind, the traditional literature would benefit from greater attention to a number of areas: achieving theoretical cogency, constructing useful methodological specifications, gathering sufficient evidence, and amending persistent anachronisms. Future research probably can fully resolve most of these difficulties, though there will always exist limits to the availability of certain desirable data. This subsection sets out some of the general problems; more specific discussions of the available quantitative studies and suggestions for future work appear in the final section of the paper.

Gerschenkron is a sensible place to begin. From the perspective of generalization, a significant problem with Gerschenkron's hypothesis is the specificity of the theory to a narrow range of cases and limited empirical support. His views on the German case, in particular, come in large part from his own observations of the way in which banking seemed to operate. As Sylla (1992) aptly describes, Gerschenkron's experiences growing up in inter-war Vienna colored his view of banking and industrialization. For example, Gerschenkron reminded his readers that "[he had] had a close personal opportunity of watching how, in the 1920s, the representatives of the Credit Anstalt appeared weekly at two machinery factories in a little industrial town near Vienna. They participated most intimately not just in all entrepreneurial decisions, but in many managerial decisions, and their word was received as command by the directors of the two firms."<sup>49</sup>

There are several obvious reasons why Gerschenkron's personal experiences may prove insufficient for understanding Austrian industrialization, much less that of Germany and the rest of continental Europe. First, the observations he made on a small number of companies may not fit more generally even in inter-war Austria. Second, the Austrian experience may not necessarily be generalized to Germany or the rest of Europe. Third,

---

<sup>48</sup>Kocka (1980), p. 92, cited in Herrigel (1996), p. 83. Such a sentiment was expressed much earlier by Whale (1930) and even to some extent by Riesser (1910, 1911).

<sup>49</sup>Gerschenkron (1977), p. 55. Quoted in Sylla (1992), p. 46.

the 1920s may provide an inaccurate portrait of the pre-World War I experiences in many cases.

Clearly, Gerschenkron's views on German industrialization did not rely exclusively on his own observations in inter-war Austria, but he did not avail himself of broad-based evidence for Germany either. Yet it would be unfair to single out Gerschenkron on this point. For details of the German case, many authors (apparently including Gerschenkron) rely on the accounts of such contemporaries of the late industrialization period as Riesser (1910, 1911), Hilferding (1910), and Jeidels (1905). These authors had even greater stakes in the debates over universal banking in Germany: Jakob Riesser was a director of one of the largest universal banks, Otto Jeidels was an employee of another such bank, and Rudolf Hilferding was a well-known socialist critic of capitalism and the power of the banks. Perhaps more important than ideological biases, however, these older works are largely founded on the experiences of a small portion of the economy and a limited period of time. Such biases become problematic when the resulting works are extrapolated to the rest of the economy or to earlier time periods.

As a result, Gerschenkron's hypothesis concerning Germany (or the orthodox paradigm that has developed around it) includes a number of ill-supported notions about what functions the universal banks performed, when the characteristic features of universal banking developed, how much influence the banks had over industry, and the ultimate effects of the structure of the German financial system on industrialization and economic growth. While the fact that Gerschenkron's work rests on little empirical evidence or analysis does not automatically invalidate his thesis, it does leave his hypotheses open to revision. The apparent generality and sweep of Gerschenkron's theories on financial institutions and industrialization also invite criticism and skepticism.<sup>50</sup>

Problems with the earlier historical literature may create difficulties for more recent work, since many assume that the role of financial institutions is what Gerschenkron and his followers have argued it was. If the structure and function of financial institutions does not fit the orthodox view, then the foundation of the Gerschenkron hypothesis is fundamentally unstable. In particular, it seems likely that marked changes in the organization and operations of the German joint-stock banks between 1850 and 1913 mean that these institutions reached the Gerschenkronian ideal long after the main phases of industrialization, if ever. Recent papers have made some use of theoretical advances in economics in an attempt to place the historical experience in a more modern framework.<sup>51</sup> Yet,

---

<sup>50</sup>Early skepticism emerges in Cameron (1972) and Rudolph's chapter (on Austria) in the same volume. Tilly's (1967) work on Germany also offers moderation, though he is generally supportive.

<sup>51</sup>Calomiris (1995), Fohlin (1994), DaRin (1996), and Hauswald (1995) for examples using the newer theoretical literature on information asymmetry and agency theory. The latter two papers essentially recast the Gerschenkronian paradigm in modern language. Tilly (1986, 1992, 1994) and Kennedy and Britton (1985) use the standard CAPM and portfolio theories to test the efficiency of the German system (in comparison with the British). These papers are discussed subsequently.



because both theoretical and historical studies often rely on the same possibly inaccurate and often anachronistic accounts, they are equally restricted in their usefulness.<sup>52</sup>

The orthodox view of German universal banking stresses the size and structure of the banks, the involvement of the banks in the formal governance of industrial firms, and to some extent the efficiency of intermediation and diversification provided by the banks. Less tangible, but equally crucial to this paradigm, are the entrepreneurial spirit, informal oversight and control, and willingness to take risks that are also attributed to the directors of the German industrial banks (all of which are usually supported on the basis of a handful of prominent cases). The fundamental lesson of the historical literature is that the universal banks were powerful institutions that played an important role at least in the later stages of the German industrialization. Thus, while institutional structure is central to widely-held beliefs about German banking, most views of universal banking in German economic development also hinge crucially on characteristics unrelated to financial system organization: culture, time and place, and individual personalities, for example.

The modern economics literature, however, looks to the historical record for insight into the consequences of the organization of financial systems for industrial growth and development. The existing historical literature therefore may prove insufficient for deriving such economic implications: even if banks did play a crucial role in German industrialization, their effectiveness may not have resulted from their structure as universal banks. Likewise, perceived failures of other systems the British, for example may be due to idiosyncratic characteristics. Given the current state of knowledge, therefore, it may be impossible to replicate the German experience in other contexts or to determine whether such a goal would be desirable. This problem, in particular, underscores the need for economic theory in providing testable generalizations that might be used in understanding modern problems. Theoretical underpinnings can reveal potential flaws in the standard arguments and offer new ways to approach the long-standing questions and debates about the German experience with universal banking.

The bank power debate is just one example of an historical debate that might benefit from insights of modern theoretical work on banking and financial contracting as well as further empirical research. Much historical work focuses on the question of the dominance of banks over firms with limited reference to the economic effects of that power. Other work has emphasized the efficiency enhancements engendered by the banks' control with little substantial proof and without theoretical justification of the need for formal bank relationships in the process of rationalization. In order to understand the economic importance of bank power, one needs to draw a connection between bank control and systematic differences in firms' behavior and outcomes.<sup>53</sup>

---

<sup>52</sup>This issue receives further attention in the final section of the paper, which discusses recent reevaluations of the historical record.

<sup>53</sup>Tilly (1994), p. 104, also makes this point: “[this literature] has only rarely made use of economic theory, which thus limits the generalizations which can be made from it.” Baskin and Miranti (1997) also argue for the use of theory in interpreting the evolution of financial institutions and corporate finance

### III. THEORETICAL PERSPECTIVES ON UNIVERSAL BANKING

#### *A. The central characteristics of universal banking*

Universal banking is often discussed as if it were a well-defined and static principle. In reality, the concept of universal banking has evolved gradually over time and the practices associated with this style of banking have also changed. Benston (1994, p.121) is not alone in claiming that, “Germany today and before the second World War offers the best example of universal banking.” Similar financial institutions certainly existed in other continental European countries, but German banks seem to have led the way and have become synonymous with the term universal banks.

As Tilly (1992) and others have made clear, the forerunners of German universal banking arose in the middle of the nineteenth century. The primordial universal bankers of the 1840’s and 50’s, however, were private banks that bore little resemblance to the twentieth century universal bank. Even ignoring the question of demand for industrial finance at the time, strict regulations on incorporation and limited liability likely limited both the possibility of externally financed banks and the potential clientele for universal banking services. By the formation of the German Empire in 1871, after much relaxation of corporate regulations and a strong wave of industrialization, the universal banks had become organized under the joint-stock form and were unregulated except by the general laws applying to German share companies (*Aktiengesellschaften* or *Kommanditgesellschaften auf Aktien*). It is really from this point that the German universal banks began to take on their modern form.

The most fundamental characteristic of universal banking is the joint provision of a wide range of financial services by the same institution. Universal banks are, thus, the supermarkets of corporate finance. Since true universal banks are allowed to provide virtually any product, the term is often defined in terms of the services that commercial banks in the US, for most of this century, have not been permitted to offer. Specifically, universal banks typically combine traditional commercial banking functions (short-term credit, deposit taking, payments clearing, bill discounting) with underwriting and trading in securities. Modern universal banks also sell insurance, mortgages, and investment funds, though they usually do so through affiliates.

Additional practices have become identified with universal banking, mainly because they frequently coincide with the principal traits of this style of finance. Examples include branching over extensive geographic areas, holding securities of client firms, voting shares in proxy for customers, and sitting on the boards of directors of client firms. These operations are also out of bounds for American commercial and investment banks.

Thus, it is useful to delineate two sets of bank characteristics, universal banking and relationship banking, whose coexistence may offer synergies, but which may in practice

---

since medieval times. On the other hand, their analysis of the historical record rests on little empirical evidence.

exist independently of one another. Universal banking can be defined as the joint production of multiple financial services (investment banking, commercial banking, retail securities business, mortgage, and insurance). The provision of many services over several phases of firms' development may tend to lead to long-term relationships between firms and financial institutions, but formalized relationships depend on a further set of activities. Relationship banking can be viewed as a separate category involving practices related to the ownership and control of firms (long-term debt and equity stakes, proxy voting of shares, and interlocking directorates between banks and firms). Not all universal banks perform the complete range of allowable functions, and not all financial institutions that provide some of these functions are universal banks.

History offers a number of examples. Japanese banks have at times operated as universal banks while being prohibited from holding equity stakes and board positions in underwritten firms; they have also been permitted to engage in interlocking directorates with industry while being restricted in the scope of their financing services. Likewise, banks in the US were permitted to combine investment and commercial banking until the passage of the Glass-Steagall Act in 1933; though interlocking directorates had been progressively restrained at the turn of the twentieth century and then essentially prohibited by the Clayton Act in 1914. Furthermore, not all specialized or arms-length systems result from prohibitions on universal or relationship banking: British commercial banks, for example, have always been permitted to engage in universal and relationship banking, but have apparently often refrained.

The question of branching, though often appearing in discussions of universal banking, is really a separate issue. While the practicality of universal banking may hinge on size, it is not clear that branching is a necessary condition. Indeed, the first universal banks were unit banks, and those in Germany operated as such for decades before beginning to branch. Moreover, since the principal benefit of geographic dispersion is diversification potential, branching may be equally beneficial to specialized banks.

### *B. The modern view of financial intermediation*

There is little debate over the actual practices of universal banks, at least not for most of the twentieth century, but there is significant disagreement over interpreting the motivation and impact of these functions in the context of modern theories of corporate finance and current debates over the optimal structure of financial systems. In order to understand the theoretical implications of universal banking, it is useful first to place these institutions in the more general context of financial intermediation.

#### *Existence and functions of intermediaries*

The fundamental role of financial institutions is to intermediate between the sources and uses of financial capital in the economy; they can do so with or without changing the qualities of the assets involved. These two types of intermediation, brokerage and qualitative

asset transformation (QAT) form the core of banks' activities. Financial intermediaries arise because they can provide such services at lower cost than can individual savers and borrowers.<sup>54</sup>

In some cases, the limitation on investment is the lack of information about opportunities: those holding wealth are often unacquainted with those in need of funds. Much as a real-estate agent facilitates the transfer of property, a financial intermediary can act as a broker simply by providing an easily identifiable place for buyers and sellers to transact. This service lowers transactions costs and broadens the accessibility of finance, thus raising the quantity of capital available.

The work of intermediaries also involves changing the characteristics of financial claims. Individuals use their wealth to buy deposits at financial institutions, and those institutions invest the funds in a wide range of projects. In many cases, the deposit contract has a maturity and liquidity that is different from the loans or other assets that are created. Liquidity and maturity transformation therefore stem from the variation in the requirements of debtors and creditors. Relative to deposits or cash, capital investment is assumed to yield higher average per-period returns, but requires a longer time horizon to pay off. Assets are best invested in capital if they are not needed for a significant period of time, but should be held in more liquid form if they may be needed on short notice. The difficulty is that wealth holders typically are unlikely to know with certainty the timing of their cash needs over their lifetimes; thus, intermediaries can pool deposits and invest in an asset portfolio that reflects the expected distribution of future demands for liquidity. By mobilizing resources that would otherwise sit idle in wealth holders' mattresses, financial intermediaries expand the quantity of assets available to entrepreneurs. By investing in a range of projects, financial institutions also diversify the portfolio of depositors.

Much of the intermediary's theoretical cost advantage over individual investors stems from problems of asymmetric information between entrepreneurs and their potential sources of finance. Incomplete or imperfect information may open the door for sub-optimal use of funds or misreporting of returns, that may be most efficiently diminished by a financial intermediary. Even when information problems have no sinister implications, the process of intermediation can also help diversify depositors' portfolios. Since capital investment often requires outlays in substantial denominations, individuals likely face limits the number of different projects to which they can contribute.

Poor information about entrepreneurs' quality, and thus the distribution of potential pay-offs, can lead to the refusal of financing at any price. If loan applicants cannot be distinguished from one another, then a single interest rate must be applied to all. Under certain assumptions about the distributions of project returns, the maximum acceptable interest rate increases with the riskiness of the borrower, and increases in rates cause

---

<sup>54</sup>Bhattacharya and Thakor (1993) provide a nice review of the theoretical banking literature up to the early nineties. Allen and Santomero (1998) offer a critical assessment of traditional theories of intermediation in light of institutional changes in financial markets.

the safest borrowers to exit first. Thus, when unobservably heterogeneous borrowers are pooled, it is impossible to find an interest rate at which all risks are priced properly, and credit rationing results.<sup>55</sup> The need for credit rationing diminishes as the ability to estimate returns improves. Thus, if those with superior abilities to differentiate among potential borrowers become financial intermediaries, then such institutions may partially alleviate credit rationing.

### *The pecking order of financial instruments*

So far, the discussion has not differentiated among the types of claims that financial intermediaries create and trade in the process of financing investment. In a tax-free world with free markets, perfect competition, and symmetric information the choice among financial instruments has little consequence for firms. Under such conditions, Modigliani and Miller (1958) proved their now well-known proposition that firms cannot alter the total value of their securities by varying the mix between debt and equity. That is, capital structure is irrelevant. The stringent Modigliani-Miller conditions, however, rarely hold; consequently, firms may require disparate forms of finance.

Many theories of capital structure, most hinging on problems of asymmetric information and agency problems, have appeared in the past several years. In this literature, information and preference gaps between firms (or managers) and potential investors create differences in the desirability of various types of financing. Because such problems are inherent in the use of any outside funds, recourse to external finance may raise financing costs. In the extreme, internally-generated funds may constitute the only viable means of financing new investment. Only in the presence of mechanisms able to transmit credible information and ameliorate conflicts between managers and investors is external finance viable.<sup>56</sup>

Firms seeking outside finance must then decide between debt and equity, and that choice is based largely on the relative costs of the two instruments. Returns on debt to outside investors are bounded above and therefore rely less on the actions firms take. Equity gains, in contrast, depend directly on firm valuation and thus on the quality of managers and their investment opportunities. Moreover, firms have the incentive to issue new equity when insiders believe shares to be overpriced. Such information problems theoretically lead to the underpricing of equity and the rejection of worthwhile projects by existing shareholders. Consequently, when it is difficult to determine firms' worth (either *ex ante* potential or actual outcomes), debt incurs lower information-related costs from investors and is preferred by them over equity.<sup>57</sup> Likewise, when the potential for

---

<sup>55</sup>Stiglitz and Weiss (1981) address this problem, and much further research follows from that paper.

<sup>56</sup>Agency problems, as in Jensen and Meckling (1976), arise when firms are controlled by agents whose incentives are not bound to those of owners or financiers.

<sup>57</sup>There are now several well-known theoretical models comparing the costs of debt and equity finance. Problems of information about opportunities motivate Myers and Majluf (1984); while difficulties in *ex post* monitoring and state verification inspire Diamond (1984), Gale and Hellwig (1985), and Townsend (1979). See Harris and Raviv (1991), Hellwig (1991, 1997), and Calomiris (1993) for reviews of this and

managerial perquisites and overinvestment is high, debt can increase managers' relative stake in the company and reduce the availability of funds available for overinvestment.

Debt itself is a heterogeneous category comprising varying degrees of maturity, liquidity, collateralization, intermediation, and monitoring. A firm's options among these alternatives are constrained by its inability to relay information credibly to securities markets. Bank loans, because they are typically the most closely monitored mode of finance, are usually seen as the first step to gaining a reputation for high quality and proper disposition of outside funds. Such monitoring is thought to alleviate asset substitution as well as under- and overinvestment (Jensen and Meckling, 1976, Myers, 1977, and Stulz, 1990). Compared to bonds, however, bank debt may impose additional costs that result from monitoring, renegotiation, and the potential for rent-extraction due to the banks' access to proprietary information.<sup>58</sup> Thus, firms may avoid bank financing when bond-issuance is feasible.<sup>59</sup>

The pecking order hypothesis also suggests that financing decisions may change over the firm's lifecycle. Often, quality and availability of information grows with the development of the firm so that firms may experience fewer information-related problems as they become older, larger, and have possibly established track records. The fact that reputations take time to establish suggests that mature firms face lower relative costs of equity and often opt to reduce their exposure to fixed debt payments. That is, minimizing information problems reduces the cost gap between internal and external funding and between debt and equity securities and thus alters firms' tradeoffs.<sup>60</sup> Thus, seasoned firms should tend towards more equity in their capital structure relative to immature firms.

### *Financial system structure and the optimal provision of finance*

The theoretical research on modes of financing raises the possibility that the efficiency of financial institutions may depend on the scope of their activities. Therefore, the structure of financial systems may affect the overall efficiency of corporate finance. While there are certainly physical costs involved in providing finance, the costs related to information transmittal attract the most attention in recent research. Each step between saver and investor adds costs, so institutions that minimize the number of transactions or times information needs to be transferred should gain an advantage.

The previous section discussed the now widely-accepted theoretical proposition that firms' financing needs are likely to vary over time. Universal banking systems provide

---

related literature. See Baskin and Miranti (1997) for discussion of the historical relevance of the pecking order hypothesis and other related theories of corporate finance.

<sup>58</sup>See Rajan (1992) on the possible monopoly rents accruing to banks due to private information about firms.

<sup>59</sup>Diamond (1991) models the choice between monitored bank debt and directly-placed bonds. See also Chemmanur and Fulghieri (1994).

<sup>60</sup>In the Myers and Majluf model, in the absence of information problems, firms always fund investment with equity.

all three types of financial claims (bank debt, bonds, and stocks) within one institution, whereas specialized systems often distribute services across several types of intermediaries. Thus, some have argued that universal banking creates economies of scope. If information about a given firm can be reused for the provision of multiple services, universal banking will yield cost advantages over specialized systems. By similar arguments, reputations gained in one branch of financing may spill over into others and promote freer entry into all financial services.<sup>61</sup> Lower costs may translate into a higher volume of finance and therefore stronger investment by industrial firms. Access to information about the full range of financial assets may also enable universal banks to achieve closer to optimal diversification of investments than can specialized intermediaries.

Universal banking may also encourage the creation of long-term relationships, because of the incentives for both bank and firm to do business with one another repeatedly. Multi-period optimization of financial contracting, however, may be susceptible to time-inconsistency problems. Having received relatively cheap finance when young, a firm may subsequently find itself able to procure outside funds more cheaply than through its original bank. The bank's knowledge of this possibility *ex ante* will discourage the bank from providing the start-up capital. Thus, a number of explanations of creditor relationships have underscored the possible need to enforce long-term relationships through formal institutions, such as equity stakes and bank representation on firm boards.<sup>62</sup>

Beyond its potential role in enforcing commitment between banks and firms, relationship banking may create its own advantages quite apart from universal banking. Compared to systems in which banks do not take such active, direct roles in the firms they finance, some have argued that relationship systems promote stronger, more efficient investment.

Much of the theoretical work on the existence of financial intermediaries focuses on the need for supervision that arises due to asymmetric information between entrepreneurs and investors. If monitoring is a crucial ingredient in intermediation, then systems that permit close monitoring may yield advantages over those that take a less active oversight role. The placement of bank directors on the boards of firms may facilitate the monitoring of firms activities and outcomes; improved oversight in turn potentially benefits firms in a number of ways. Careful monitoring makes loans more secure and may enable a bank to extend credit to firms it would otherwise ration for lack of information. Even when information problems would not be prohibitive, oversight may substitute for collateral and may therefore allow the bank to finance firms with apparently good projects but with insufficient collateralizable assets.

The formalized bank-firm relationships that enforce economies of scope may engender a long-term perspective on investment programs, so that firms with bank monitors may

---

<sup>61</sup>Calomiris (1995) focuses on information reusability, while Rajan (1995) discusses both arguments. See Greenbaum, Kanatas, and Venezia (1989) on theoretical economies of scope resulting from information reusability.

<sup>62</sup>See Mayer (1988), James and Wier (1990), Calomiris and Himmelberg (1993), and Petersen and Rajan (1994) for theories and some evidence.

engage in qualitatively different projects than they would in the absence of the relationship. If investments with the highest *ex post* returns sometimes take longer to bear fruit, then firms that have the leeway to make such investments may yield higher long-run returns than those forced to pay back loans quickly. More precise pinpointing of the causes of poor short-term performance allows remedying of under-performance without premature liquidation of projects with high long-run value.<sup>63</sup> Thus, relationship-based systems may raise firms' long-run returns.

In a related vein, it is often argued that relationship banking improves the allocation of corporate control. Arms-length systems discipline management through market mechanisms, such as mergers and take-overs. The problem with market-based systems is that managerial failure may be difficult to detect from the outside: poor performance alone does not conclusively imply managerial slack or incompetence. Relationship banking, in contrast, is often seen as obviating market mechanisms. As in the monitoring of investment projects, bank oversight and control may permit quicker, more accurate weeding out of poor managers without sacrificing good managers stuck in relatively adverse circumstances.<sup>64</sup> Thus, relationship banking may further boost firm efficiency and long-term value by both minimizing unnecessary turnover and expediting beneficial attrition.

From the perspective of securities underwriting, as well, relationship banking may improve the efficiency of financing. Banks are thought to offer important screening services, and close bank involvement with firm's management may create advantages in gathering the information necessary for successful *ex ante* monitoring.<sup>65</sup> Access to information may allow more accurate valuation of share capital worth, and the good reputation of the underwriter may increase the market for firms' shares. Formalized bank relationships, for example through bank representation in firms' boards, may then signal firms' quality to potential investors. Together, these effects may lower the cost of securities issue and increase firms' access to capital markets.

These possible roles of universal, relationship banking in monitoring, signaling, and ameliorating conflicts of interest suggest that the behavior of financial intermediaries may also influence the capital structure of firms. In particular, institutions that facilitate access to firm information and coordination of diverse interests may temper the problems that lead to inefficient financing decisions. Bank oversight may lower the relative costs of and increase access to bank finance, so that bank-attached firms may have higher leverage (with greater reliance on bank debt) than independent firms on average. If bank relationships narrow information gaps and improve firms' ability to gain positive reputations in capital markets, then such involvement should also reduce the cost differential

---

<sup>63</sup>Narayanan (1989), Stein (1989), Dewatripont and Maskin (1995), and von Thadden (1995) offer models of this problem.

<sup>64</sup>This idea is nearly the same as the previous, though the target of monitoring (projects or managers) is different. See Stiglitz (1985) for a clear discussion of the potential shortcomings of arms-length mechanisms for insuring shareholder value maximization.

<sup>65</sup>See, for example, Boyd and Prescott (1986) on the role of banks in channeling investment to highest return projects.



between debt and equity. In line with the pecking-order hypothesis, then, formal bank relations should speed firms' movement from debt to equity financing. Universal banks' provision of equity underwriting and brokerage, in addition to all kinds of debt services, should further facilitate adjustments in capital structure.

Much of the recent theoretical work deals with the problems of asymmetric information that often exist between firms and potential investors or lenders. Relationship banking is seen, in theory, as a means of equalizing information and resolving to the extent possible the uncertainty that accompanies finance. Even with the best possible information, outcomes are rarely certain. Thus, lenders and investors, as well as the firms themselves, also face some measure of risk. An important task of any financial system is to manage and distribute that risk. If relationship banking enables bankers to reveal true risks, then such practices may also improve the allocation of risk among investors. Moreover, the fact that universal banks engage in all types of financial transactions may allow these institutions a greater choice of instruments through which to diversify risk. Improved risk sharing will, theoretically, increase the economy's willingness to invest and also reduce the costs of such investment.

A principal upshot of the theoretical literature is that the existence of financial intermediaries in general can enhance both the quantity and the quality of investment in the economy. But it may also be argued on a theoretical basis that relationship banking further raises the quantity of funds provided to industry and may also increase both the quality of projects undertaken and the long-term returns to investment.

#### *Costs of universal banking and relationship banking*

Not all work on universal banking supports the view that universal banking and relationship banking offer unequivocal improvements in the efficiency of corporate finance. Some have argued quite the opposite: that combining services into one institution and allowing share-holding and interlocking directorates between banks and their clients leads to several kinds of inefficiencies.

Though there is little theoretical work on the subject, universal banking has long been claimed to undermine the stability of the financial system. Instability may result from banks' equity stakes in firms—a position that exposes the banks to business downturns and the vicissitudes of the stock markets. In addition, the combination of lending and securities underwriting permits banks to float loans on the assumption that future securities issues can be used for repayment. Any subsequent difficulty with issuing the firms' securities can then endanger the bank and perhaps the financial system more generally.<sup>66</sup>

Even if universal banking does not create financial fragility in practice, avoiding instability may lead to under-investment in risky projects. Because a universal bank must

---

<sup>66</sup>These hypotheses are discussed in White (1986), Benston (1994), and Kroszner and Rajan (1994). Of course, equity stakes are part of relationship banking and may be absent in a universal banking system.

protect depositors, it may be unable to finance high risk sectors that may offer higher returns. If universal banks can prevent non-depository investment banks from entering the market, then the system may bias investment toward conservative, low-growth sectors of the economy.

Universal banks may also suffer from conflicts of interest. Such conflicts may arise because banks are able to underwrite securities for the firms to which they lend. In situations of asymmetric information between the bank and its customers, banks may be tempted to issue securities for distressed firms in order to liquify doubtful debts. The bank could then sell the low-quality securities to customers. While a bank that repeatedly issues inferior securities should theoretically lose its reputation and potentially its business, occasional under-performing securities may not provoke flight.

Due to another form of possible conflict of interest, universal banking has also been hypothesized to discourage the development of active stock markets. Since universal banks may trade securities and also take deposits, they may gain an advantage over specialized stock brokers in attracting clients. Internalization of the secondary securities trading within universal banks is detrimental to investors if markets are constrained in size and volume or are segmented due to multiple trading centers. Universal banks' trading of the securities they hold and underwrite may undermine the banks' incentive to offer the optimal portfolio to investors. The fact that universal banks may hold securities for a variety of reasons, including poor performance, undermines the signaling value of bank equity stakes and further subverts efficiency in the allocation of capital.

Two very different types of anti-competitive behavior may result from universal and relationship banking, particularly in the absence of competitive markets. First, the economies of scope that possibly motivate the combination of many services in one institution may also lead to concentration in financial services. If concentration is excessive, it may lead to market power, higher costs of finance, and poor service to depositors and borrowers. Furthermore, the ability to compete in several different markets may facilitate limit pricing and enable universal banks to stave off competition from specialized intermediaries even in segments in which the universal bank is relatively inefficient.

Second, many have posited that the involvement of banks in the management of companies leads to cartelization of industry. In a relationship banking system, intermediaries may have access to important strategic information for several firms in the same sector, and such information may permit the bank to orchestrate mergers or enforce cooperation. These activities, while perhaps benefitting some firms, may harm others and may reduce competition and possibly consumer welfare more generally.

The effects of universal and relationship banking may create further disadvantages for individual firms and the economy as a whole. Banks can gain proprietary information about the firms they finance, either by providing multiple services over time or through direct access to company boards. When firm quality is difficult to observe from the outside, being an informed insider may permit an intermediary to extract rents in the form of high costs of finance. In such a system, costs of switching intermediaries are

high, because other banks may interpret a firm's attempt to change banks as a sign that the original bank declined to provide further funding.<sup>67</sup> When the market for financial services is not competitive, the potential costs of hold-up problems are even higher. As a result, firms may forgo many investment programs that would be profitable in a more competitive system.

Relationship banking tends to give financial institutions direct links to the management of affiliated companies. At the most extreme, banks own shares, take seats in firms' boards, and exercise proxy votes for smaller share holders. While such insight may be seen as beneficial to companies in need of entrepreneurial expertise, explicit control over investment decisions and firm strategy may not benefit all firms or all outside investors. For banker influence in firm decisions to be beneficial, bankers must both know better than industrialists what would be the optimal choices to make and have similar enough incentives to those of the firms to see that the best decision is implemented. Equity stakes are one way to align the incentives of the bank with those of the firm and its other shareholders.

At least in the German system, however, banks are permitted to exercise proxy votes and take positions in firms' boards even in the absence of share ownership. Control without any ownership, when banks also hold firms' debt, may lead to excessive conservatism. The banks' desire for future commission business may mitigate these problems both directly and indirectly. Assuming that the bank will have a significant part in future issues, the fact that firms are more likely to issue new securities when they are growing and investing may restore the banks' incentive to take risks. Furthermore, the banks' need to maintain a good reputation with proxy owners may, in a sense, force the bank to internalize shareholders' preferences. Yet these kinds of guarantees only work perfectly in the absence of information problems and in the presence of competition. Asymmetric information, especially when the bank sector has monopoly power, may permit banks to subjugate small shareholders' interests to the banks' interests as debt-holders. Furthermore, commissions on share trading and issuing may be secondary relative to those on debt and to the value of guaranteeing debt repayment. Thus, proxy voting and equity ownership may not provide equivalent incentives.<sup>68</sup>

Clearly, the literature on universal banking offers much theoretical fodder on the micro-level effects of financial system structure. The organization of financial institutions may partly determine the extent of competition among financial intermediaries, the quantity of financial capital drawn into the financial system, and the distribution of that capital to ultimate uses. The choice between universal and specialized banking may affect interest rates, underwriting costs, and the efficiency of secondary markets in securities. Furthermore, the existence or non-existence of relationship banking may affect the quality of investments undertaken, strategic decision-making, and even the competitiveness of industry. There are then two levels at which the financial system can influence

---

<sup>67</sup>See Rajan (1992) and Sharpe (1990). Berglöf (1997) suggests that firms may maintain links with multiple banks in order to safeguard against holdup problems.

<sup>68</sup>The equivalence of proxy voting and equity ownership must be judged empirically.

the costs of finance: general effects on the economy as a whole and localized influences on individual firms and industries. At both levels, the structure of the financial system may have substantial influence on the real economy.

### *C. Financial structure and economic growth*

Given that financial institutions' efficiency may vary depending on their structure, it is reasonable to wonder whether the real effects of financial systems vary as a result. The idea that financial institutions can actively promote growth is quite old. Schumpeter (1912), for example, suggested that bankers, through their selection and funding of entrepreneurs, promote innovative activity and spur economic growth. The literature on economic growth has begun to grapple with this question, and progress in such research may help in understanding whether certain types of financial systems promote higher rates of growth and greater welfare than others.

The question of causality remains a problem in the theoretical literature, though recent work is beginning to offer models in which influences run in both directions.<sup>69</sup> Greenwood and Smith (1997) and Boyd and Smith (1996) offer a reasonable compromise: models in which financial markets arise after some period of real development, and the expansion of those markets fuels further real growth. A logical implication of these models is that exogenous creation of a financial system with advanced features may not spur real growth.

These latter two models also begin to deal with the question of the ramifications of financial system structure. Greenwood and Smith (1997) provide a first step toward thinking about such distinctions; showing that growth rates obtained in economies with either banks or equity markets exceed those of economies without financial intermediaries. Though most of the literature offers no comparison of the relative benefits of different types of financial systems, the Greenwood and Smith (1997) model shows that, with sufficient risk aversion on the part of the investing public, equity markets produce stronger growth than do banks. In a series of papers, Boyd and Smith (1994a, 1995, 1996) introduce the changing roles of debt and equity in the development process and show that, though stock markets should develop after a period of intermediary dominance, both debt and equity remain viable and complementary sources of finance.

Still, these models do not differentiate between universal and specialized banking and the possibly different outcomes such systems promote. Variation in growth effects may be inferred from some other recent work. King and Levine (1993), for example, formalize the Schumpeterian view into the framework of an endogenous growth model. In their model, the financial system affects productivity growth through four channels: screening prospective entrepreneurs in order to select the most promising projects, mobilizing

---

<sup>69</sup>The more recent literature considering the causal relationship between finance and growth includes King and Levine (1993), Japelli and Pagano (1993), Jayaratne and Strahan (1996), and Rajan and Zingales (1997). Lucas (1988), perhaps not surprisingly, expresses doubt about the importance of financial factors and excludes these considerations in his model of development.

capital to fund investments, diversifying investors' portfolios to eliminate risk, and revealing the potential benefits of participating in productivity-enhancing activities.<sup>70</sup> Thakor (1996), who is explicitly concerned with the question of financial system design, lays out six partially-overlapping links between the financial system and the real economy: screening by banks, credit rationing by banks, liquidity transformation and bank runs, loan commitments by banks, debt restructuring, and the feedback role of financial markets. In general, financial institutions may enhance economic growth by raising the total quantity of financial capital available to entrepreneurs, improving the quality (productivity) of investments, and increasing the efficiency of intermediation between the sources and uses of funds. Thus, the structure of financial systems may influence real variables, since different institutions may handle these tasks with varying efficiency.

While it is clear that financial systems vary in their real effects, it is not yet clear what kind of system offers the greatest net benefit to the real economy. Research so far suggests that there are tradeoffs between banks and financial markets in the revelation and transmission of information necessary for making optimal real decisions; the desirability of one system over another depends on the context. Allen (1992) reasons that, because markets aggregate information from a wide range of disparate sources, but banks depend primarily on their own assessments, markets dominate banks when technologies are new, complex, or rapidly evolving. Banks prevail when technologies are clearly understandable and optimal investment decisions are easy to make. Also, as Thakor (1996) argues, bank-dominated systems exacerbate effort-aversion and overinvestment, while market-based systems lead to excessive reliance on borrower reputation as well as greater asset-substitution moral hazard.<sup>71</sup> Furthermore, the analyses of von Thadden (1990) and Dewatripont and Maskin (1990) suggest that banks tend to prolong low-quality projects for too long, while markets often liquidate good projects prematurely. All of these problems can lead to sub-optimal investment decisions and lower real economic growth.

This literature, however, tends to focus on the difference between banks and stock markets in the allocation of investment capital and not on the effects of various banking structures.<sup>72</sup> This tendency arises because of the perception that universal, relationship-based banks dominate the financial systems in which they operate, and that financial markets dominate in systems in which financial intermediaries are specialized. Much of the variation in financial system structure, however, results from peculiarities of financial system regulation. Thus, it is still unclear whether universal banking in itself constrains the development of financial markets, or if government intervention in the cases so far studied simultaneously promoted banks and hindered securities markets. Likewise, it is difficult to tell whether limitations on bank operations spur financial market development, or if something else about the American and British economies or societies has led to

---

<sup>70</sup>Marco Pagano (1993) and Alexander Galetovic (1996) provide good reviews of the newer growth literature.

<sup>71</sup>Thakor bases his argument on the predictions of Rajan (1992), Wilson (1994), and Diamond (1991).

<sup>72</sup>Papers by Crane (1995) and Peters and Thakor (1995) show that variation in information availability and in incentives to monitor (both banks and borrowers) recommend functional separation between insured, deposit-financed banks to finance projects that require no monitoring and uninsured intermediaries to invest in projects associated with private information and a need for monitoring.

market-oriented financial systems.<sup>73</sup> So far, theoretical research has not rationalized the endogenous development of distinct financial system designs and their persistence in the absence of regulation. Answers to such puzzles may hinge both on making advances in theoretical modeling and on assembling a wider range of empirical evidence.

#### IV. REASSESSING THE EFFECTS OF FINANCIAL SYSTEM STRUCTURE

Even after several decades of debates over the power, scope, and timing of universal banking in Germany, questions remain about the validity of the orthodox view of banking and industrialization. Moreover, recent advances in the theoretical literature on financial intermediation suggest new questions and areas of empirical research.<sup>74</sup> At the same time, much theoretical work on universal banking is motivated by widely-held views on the organization and operations of the German universal banks, many of which may be only partly true. Thus, in order to derive useful theoretical models and apply them to the historical record, it is necessary to have a broad and accurate understanding of past experiences.

It would be difficult to argue that in no country has the financial system played a role in economic growth and the development of industry. If nothing else, banks and capital markets play central parts in the mobilization of resources. Yet the optimal structure of financial intermediaries is a separate question. Most economists and economic historians believe that the German universal banks were and are fundamentally different from their counterparts in the UK and the US. Thus, the question that still needs to be asked is whether the universal banking system per se was either necessary or sufficient for the industrialization of Germany in the second half of the nineteenth century and up to World War I.

Claiming that the universal banks were critical to the German industrialization can mean several things. In the most fundamental sense, it means that something the universal banks did was necessary for industrialization and could not have been provided by other types of institutions. The universal banks could be seen as crucial for industrialization either through their financial and political power alone or because of some effect of their institutional structure. In other words, in order to determine whether universal banking is uniquely suited to promote growth, one must be able to show that certain features of this particular system of finance are needed for the provision of sufficient capital to industry. In much of the literature, the connection between the banks' structure and

---

<sup>73</sup>Allen (1992) argues, in part, that the historical experiences of Britain and the U.S. support the idea that markets are preferable in situations of complex decision processes and rapidly-advancing technology; whereas banks should dominate where optimal investments are agreed upon and primarily just need monitoring. The question of financial system structure and innovation is addressed in Boot and Thakor (1997) and Thakor (1996).

<sup>74</sup>This is not to say that previous work has completely ignored finance theory. As previous sections note, some theoretical work has been used by researchers to describe and test the structure and functions of financial institutions in history.

industrial development, however, remains fairly loose; and the more recent debates over the timing of industrialization and the development of the financial system persist.

Thus, the first item on a research agenda should be a reassessment of the development of the German financial system and its relation to industrial change and growth. The first step in such an investigation is to evaluate the pattern of growth of the universal system as a whole. In particular, we need to determine when the characteristics that we now think of as central to universal banking arose, if at all. Three such features come immediately to mind: deposit taking and branching, bank representation on firm boards, and bank ownership of industry equity stakes.

The common perception is that universal banks gathered “large amounts of capital through the deposit of savings throughout the country...”<sup>75</sup> The combination of a broad and diversified base of deposits, and the existence of a dependable lender of last resort (the Prussian Bank and then the Reichsbank), are seen as key to the mobilization of major financial capital for long-term investment. The problem with this characterization, however, is that the universal banks’ deposit business only became significant in the 1890s, and regional diversification only came thereafter.<sup>76</sup> Before that, and especially before 1870, the universal banks depended on the issue of new equity capital to expand the supply of finance. The takeoff in the total assets of the universal banks overall coincides with the onset of the serious deposit business and the industrial boom starting around 1894—a point by which industrial enterprises could fund a significant share of investment out of retained earnings.<sup>77</sup>

A similar anachronism surrounds the representation of German banks on industrial firms’ supervisory boards and the broader practice of interlocking directorates between and among banks and firms. Such formalized relationships, because they depend on the presence of a supervisory board, could only develop after the joint-stock corporation became widespread (after 1870). Furthermore, gaining board representation was probably only generally desirable after the strengthening of supervisory boards in the 1884 company law.<sup>78</sup> Yet interlocking directorates appear to have become common only in the 1890s; long after the onset of industrialization and after many firms attained financial substantial self-sufficiency.<sup>79</sup> Moreover, interlocking directorates of the largest banks encompassed only about 12 percent of all joint-stock firms even at the peak of the later stage of industrialization (1904-5).<sup>80</sup> Since joint-stock firms represent a minority of German companies, the percentage of all firms with formal bank relationships must be

---

<sup>75</sup>Zamagni (1993). The importance of deposits is also noted in Tilly (1994), Calomiris (1995), and Herrigel (1996).

<sup>76</sup>See Fohlin (1994, 1997a) and DaRin (1996). The distinct change in liabilities structure is noted even in Riesser (1910).

<sup>77</sup>Fohlin (1997a). See also the various data series compiled by the Deutsche Bundesbank (1976).

<sup>78</sup>See Reich (1979) in the Horn and Kocka volume.

<sup>79</sup>See Edwards and Ogilvie (1996) and included references on the timing issue. See Fohlin (1997d) on the rise of interlocking directorates.

<sup>80</sup>Fohlin (1997b). This paper confirms and quantifies Whale’s (1930) contention that many of the firms assumed to be linked directly to banks were actually connected through a third party member of both bank and firm supervisory boards.

markedly lower. As a result, the general significance of interlocking directorates is likely overemphasized in the standard view of the German system and its role in industrialization.

For influencing the quality of investment, the crucial organizational advantage of the German banks is their supposed long-term participation in industrial firms. By holding industrial shares, and thereby getting themselves onto supervisory boards, the banks are thought to have monitored and even controlled the firms they financed. While most would acknowledge that the German banks did not voluntarily hold large shares in industrial firms, there is a general view that the banks typically held a small stake in firms that the banks desired to influence.<sup>81</sup> Since evidence on equity ownership is generally unavailable for German companies prior to World War I, it is difficult to determine exact share holdings by banks. Nonetheless, the evidence available indicates that particularly in the 1870-1914 period, equity stakes were very limited in number and amounted to a small percentage of banks' assets overall. Indeed, the Darmstädter Bank reported holdings of only 10 firms over the whole period 1882-1896 and no more than 7 firms in any one year.<sup>82</sup> Thus, the traditional notion of bank shareholdings also seems not to match the actual historical record for Germany, at least not before the first world war.

Clearly, banks gained significant proxy rights for shares they held on deposit from customers; yet this practice, combined with the banks' predominant status as debt-holders, suggests scope for conflicts of interest rather than beneficial oversight. That is, banks may use their control of equity stakes to further their interests as debt holders. While theoretical models could be composed, in which the need to maintain reputations forces the banks to act in equity-holders' interest, it is likely that the banks would be in an advantageous position with respect to small shareholders. And the results of acting in the interest of debt-holders—primarily excessive conservatism—may be difficult to detect in a portfolio of shares. Although the empirical evidence on this question is scant, the findings so far available suggest that firms with bank board members invested at similar rates on average, but received lower profits and rates of return than those independent of bank influence.<sup>83</sup>

In general, it appears that a number of characteristics closely identified with German universal banking developed late in the industrialization process and sometimes failed to materialize to the extent supposed in the strict Gerschenkronian paradigm. Furthermore, even once the characteristics of the universal banking system became established, it is clear that the banks' influence was unevenly distributed. Regional variation in the financial system and the relationship of such differences to the industrial, political, and even social characteristics of regions are therefore of significant interest.

Tipton prefaced his work on regional variation by saying that, "...in Germany traditional values, social structure, and the distribution of political power appear to have

---

<sup>81</sup>References to equity stakes appear in Riesser (1910), Calomiris (1995), and Zamagni (1993).

<sup>82</sup>See Fohlin (1997c, 1997e) for detailed evidence on two of the Berlin banks and general evidence on universal banks as a group. These papers also discuss the relevant theoretical literature.

<sup>83</sup>Tilly (1994) and Fohlin (1998b).



played crucial roles in the specific course of each region's development and in some instances explain why economic opportunities could be seized in one region and not in another."<sup>84</sup> This point is fleshed out well in Herrigel (1996) on the basis of a wide survey of research on individual regions of Germany. He argues that regions that began the nineteenth century with a small-scale traditional industrial base (in specialized metal working and textiles, for example) continued to develop along such lines even as the more backward regions grew in the Gerschenkronian or Chandlerian style of large-scale business and organized capitalism. Whatever the true cause of regional variation, it clearly persisted in Germany throughout the nineteenth and early twentieth centuries. Interestingly, the decentralized regions, having begun to industrialize already in the 18th century, may look more like parts of Britain than the rest of Germany.

The universal banks, as is now well known, were absent from significant portions of the German economy before World War I, but that does not necessarily mean that such sectors gained no access to financial institutions. In many regions, credit cooperatives provided the primary source of financial intermediation and mobilized small-scale resources that would otherwise remain idle. Because they nearly always formed in small towns with close-knit communities, they were able to screen potential members, monitor outcomes, and enforce repayment with relatively low costs. Though these institutions never accounted for a large share of total financial system assets, their sheer numbers (17,000 in 1909) gave them an important part in the economy, especially in certain locales. The cooperative system largely remained separate from the industrial banks, but through central institutions for pooling and distributing excess funds, the cooperatives also tapped into the universal banking system.<sup>85</sup>

Although the banks, including non-universal banks, comprise the dominant segment of the financial system, it is important also to investigate the development or the lack of development of the German securities markets. Issues of new German empire joint-stock company securities amounted to 28 percent of British empire securities in 1910, and domestic (non-government) securities amounted to a far smaller percentage of total assets in Germany than in Great Britain, Belgium, France, and the U.S. throughout the 1850-1913 period.<sup>86</sup> Nonetheless, in 1905 German stock exchanges listed nearly 2,000 German companies, or 36 percent of all joint-stock firms. Half of these firms were listed in Berlin.<sup>87</sup>

---

<sup>84</sup>Tipton (1976), p. xiii.

<sup>85</sup>Indeed, the Schultze-Delitzsch banks used a 'commercial' bank as their central. Guinnane (1994, 1998) details the role of the credit cooperatives in Germany in the late nineteenth and early twentieth centuries.

<sup>86</sup>For new issues (excluding conversions), Neymarck (1911), cited in Michie (1988). Securities as a share of assets comes from Goldsmith (1985), Appendix A. In 1913, the percentage of assets for Germany was four percent, while the figures for Britain, Belgium, France, and the U.S. were, respectively, 18, 10, 11, and 12 percent. In 1850, only France was close to Germany: two versus one percent of assets. For more comparative analysis of securities markets development, see Neal (1998). See Gömmel (1992) for a discussion of the development of the German stock exchanges up to 1914.

<sup>87</sup>Calculated from Fohlin (1997b) and *Handbuch der deutschen Aktiengesellschaften*. See Tilly (1995) for additional figures.

The extent of secondary securities markets is linked both to the structure of the universal banks and to regulations on the financial system. Universal banks' equity stakes, proxy votes, and supervisory board positions in industrial firms likely arose primarily out of the banks' involvement in underwriting and brokerage services; and much trading of securities apparently flowed through the banks. Thus, the universal banks, whose leaders also partly controlled the reins of the exchanges, internalized much secondary trading of securities. Incorporation and listing requirements in Germany seem to have necessitated investment banks or groups of investment banks large enough to underwrite the entire capital of new issues and with sufficient contacts to place the underwritten shares.<sup>88</sup> In addition, transactions taxes, as well as other regulations imposed in the 1896 law, encouraged trading outside of the exchanges and advantaged the large, Berlin banks at the expense of the provincial universal banks. As Riesser (1910, 1911) noted soon after, the new law also contributed to the concentration in German banking. Thus, it seems that the regulation simultaneously encouraged the growth of large-scale universal banking in Germany and inhibited the development of securities markets. The historical record may therefore show that universal systems do not generally inhibit the growth of capital markets; but the compatibility of the two types of institutions is also not yet established. Some recent work, such as Schulz (1994) and Tilly (1995), has begun to quantify the effects of legal changes on the structure of the German system, yet further work is clearly needed on this front especially if comprehensive comparisons of the German financial system with those of such heavily market-oriented systems as Britain and the United States is a goal.

Once the development of the German system is understood, the impact of those institutions should be analyzed at the microeconomic level. First, it is necessary to determine whether universal banking per se advantaged German firms and the economy as a whole. Answering this larger question may require settling several subsidiary issues, and the theoretical work discussed previously provides a useful framework for such an investigation.

The primary theoretical advantage of universal banking is economies of scope. That is, the combination of services within a single institution is thought to lead to greater efficiency and lower financing costs than can be achieved when separate institutions provide different, but related, financial services. Accurate measurement, however, presents a significant challenge in establishing a cost advantage. Unlike specialized investment and commercial banks, universal banks may be able to manipulate prices in order to earn extra-normal profits on some products while maintaining competitive levels on others. Thus, in measuring the relative costs of two systems, it is important to consider all sources of finance. In practice, however, it is difficult to establish and find data on the relevant costs and prices for comparable time periods. For example, the same Calomiris (1995) paper cited previously makes a strong theoretical case for economies of scope, and attempts to compare underwriting spreads charged on initial public offerings in Germany

---

<sup>88</sup>For example, after the company law of 1884, companies were required to have fully paid up share capital before beginning operations. On this law, see Hommelhof and Schubert (1984). On the 1896 law see Meier (1992).

and the United States. Yet the evidence there (and additional evidence provided in Tilly, 1994) is scant and difficult to interpret.<sup>89</sup>

Even if economies of scope exist, cost savings are likely to depend on the extent of competition in banking. In the absence of perfect competition, economies of scope may be reflected in higher bank profitability rather than lower prices; though imperfect markets may permit bank managers to dissipate rents or hide profits. Thus, efficiency gains may be meager or fail to materialize at all. In contradiction of the economies of scope argument, recent research finds that Japanese firms with bank relationships actually face higher costs of capital than those without.<sup>90</sup> Furthermore, size differences, and thus economies of scale (not scope), may account for cost savings as well. Thus, size must be controlled for in cost comparisons.

The conclusion has to be that more evidence on the industrial organization of the banking sector, and its effects on efficiency, is in order for the German case.<sup>91</sup> Alternative implications of such efficiency should also be sought. One possibility is firms' investment patterns. If universal banking does indeed reduce overall financing costs relative to separated systems, then increased levels of industrial investment may result if such investment depends on external finance, and if demand for financing is sensitive to its cost. All else equal, more projects should be worth funding in systems with lower costs.

Others have also argued that universal banking improves the allocation of investment in the economy as a whole. In one of the few quantitative, theoretically-based investigations of the effects of the German banking system, Tilly (1986) argues that, "financial institutions influence economic development mainly through the provision of opportunities for wealthholders to diversify their portfolios and the related stimulus to the supply of risk-bearing capital."<sup>92</sup> While there is a fairly loose theoretical connection here, the hypothesis seems to be that universal banks offer superior diversification potential, both because of the range of financial services they provide, and due to their advantages over specialized systems in the acquisition of information. As noted previously, Kennedy and Britton (1985) and Tilly (1986) find support for this argument. Given the difficulty in measuring the required variables, the small sample sizes, and the heroic assumptions required to implement the theory (such as competitive markets, homogeneous risk preferences, symmetric information, and zero transactions costs), it is difficult to draw strong conclusions from the existing evidence. Perhaps more fundamental, though, is the problem of assigning credit for the diversification of the whole economy to the universal banks in the first place, and to the structure of those institutions in the second.

---

<sup>89</sup>Several studies of economies of scope in American banking, most of which find meager gains at best, are discussed in Calomiris (1995) as well as in Rajan (1995).

<sup>90</sup>Weinstein and Yafeh (1995).

<sup>91</sup>An example of such work is Grossman's (1997) paper on competition and efficiency in British banking in the pre-World War I era.

<sup>92</sup>Tilly (1986), p. 115.

As the theoretical discussion pointed out, universal banking, though not always tied to relationship banking, is thought to lead to long-term relationships between banks and firms. Formalization of those relationships, usually through share ownership and board membership, is seen as an important means of overcoming time inconsistency problems and enforcing repeated interaction. Interlocking directorates are also hypothesized to allow banks to carefully monitor the firms to which they lend. Moreover, formalized bank relationships are characterized as mechanisms for enforcing rationalization such as cooperative agreements, mergers, and acquisitions in industry. In short, interlocking directorates are seen as the key to the activist role of universal banks during the German industrialization.

Given the theoretical importance of interlocking directorates, firms engaged in such relationships should receive greater attention from banks, should experience fewer problems of asymmetric information, should be rationed less, and should encounter lower costs of finance than those in similar economic positions but without close bank involvement. Thus, even within a given economy, the efficiency of finance and resulting rates of investment should vary substantially across firms. From the monitoring perspective, bank relationships may be particularly important for young firms as well as those with insufficient collateral, high ratios of debt to equity, or relatively long gestation periods before returns appear.

Despite the cogency of the theoretical scenarios, however, and their consonance with orthodox historical views, recent research has begun to cast doubt on such interpretations. Especially notable is the finding that, controlling for a broad range of firm characteristics, high rates of investment are not associated with bank representation on firms' supervisory boards. In addition, other firm characteristics expected to be associated with involvement in interlocking directorates, for example, debt-equity ratios, profitability, and firm age, fail to emerge as significant predictors of bank affiliation. Indeed, the strongest indicator of interlocking directorates is listing on a stock exchange. Moreover, formal bank oversight does not increase access to bank debt and seems, if anything, to slow firms' movement through the financial pecking order.<sup>93</sup>

The theoretical literature is widely interpreted as implying that bank relationships should ease financing constraints. Evidence on firms' liquidity constraints, however, is plagued by methodological debates and is, in any case, mixed. Historical studies of Germany and Italy show that investment was no less sensitive to firms' liquidity, and in some cases was more sensitive, for bank-affiliated companies than for those without formal bank connections; yet one study of German mining firms finds the opposite.<sup>94</sup>

---

<sup>93</sup>See Fohlin (1997b) on assessing the motivations for interlocking directorates and Fohlin (1998c) on bank oversight and firm capital structure. The lack of bank records for the pre-World War I era hinders investigation of the collateral taken on loans to firms.

<sup>94</sup>Both Fohlin (1998b) on German firms in the decade before World War I and Fohlin (1998a) on Italy during the same period find investment to be related to firms' liquidity. The former discusses potential methodological problems, especially the potential bias induced by the selection of firms into bank relationships. Kaplan and Zingales (1997) present a critique of linear models of investment sensitivity contained in the heavily-cited work of Fazzari, Hubbard, and Petersen (1988). Becht and Ramirez (1993)

Moreover, modern empirical studies also come to contradictory conclusions; some finding large decreases in bank-attached firms' liquidity sensitivity, and others finding the opposite.<sup>95</sup> More conclusive evidence is needed and likely hinges on gathering larger samples and improving the methods for discerning liquidity constraints and rationing and for controlling the effects of selection bias.

The theoretical section discussed two further outgrowths of bank relationships, better screening of firms and improved corporate control, that historical research hardly discusses. The latter hypothesis, that bank oversight minimizes unnecessary turnover while weeding out bad managers quickly, is appealing. However, for the same reasons that outsiders at the time would be unable to discern accurately between bad managers in good circumstances and good managers in bad circumstances, the corporate control hypothesis is difficult to test empirically. Similarly, the seal of approval argument also makes sense, but it is hard to know what private information banks had that investors could not access or evaluate themselves.

On both counts, however, indirect evidence may offer insights. In particular, both theories suggest that firms with formal bank involvement should have higher long-run rates of return than firms without. Perhaps more broadly, the theories suggest that firms in relationship banking systems should experience higher rates of return than firms in market-based systems. In addition, firms who have been screened should have greater access to outside debt and equity and, all else equal, should therefore invest and grow more. The little existing firm-level evidence is not very supportive of these hypotheses: bank board membership is not associated with higher investment and is, according to Rettig (1978) and Tilly (1994), negatively associated with rates of return.<sup>96</sup>

Empirical research cannot end with evaluating the benefits of universal and relationship banking. Indeed, if future work continues to cast doubt on the traditional view of the advantages of the German-style financial system, then investigating the disadvantages is even more crucial. Opponents of universal banking and formal bank attachments have long argued that such arrangements lead to instability, conflicts of interest, and anti-competitive behavior. Though empirical work on Germany and the U.S. has tended to reject such notions, a more subtle result of such problems largely has been ignored. That is, the potential for instability and conflicts of interest, and the existence of hold-up problems due to bank control, may lead to conservatism on the part of banks or firms. Such inhibition may cause underinvestment; and the problem may be the worst for firms

---

find, in a very small sample of German mining firms, that bank-affiliated companies experience lower investment cash-flow sensitivity than independent firms.

<sup>95</sup>See Elston (1997), Chirinko (1997), Hoshi, Kashyap, and Scharfstein (1990), and an unpublished study by Hall and Weinstein discussed in Hellwig (1997).

<sup>96</sup>The findings on rates of return raise another logical inconsistency: if the banks were important because they took risks in financing promising new technologies, then they should have received higher long-run returns than they would have financing safe projects. Their ability to diversify portfolios and should not have reduced rates of return below safer projects. There is so far little quantitative evidence about the risk associated with the bank-affiliated companies, but on the basis of returns, investors seemingly would have done consistently better by investing in a portfolio of firms without bankers on their boards than with.

with formal bank involvement. These considerations suggest that positive effects on investment discussed previously may be at least partially offset.

Virtually all of the theories relating to interlocking directorates and economies of scope lead to conclusions about firms' investment patterns. These outcomes naturally influence the firms that are directly involved, but they may also translate into advantages at the macroeconomic level. The firm-level evidence thus far available, however, is mixed. Thus, establishing the investment patterns of firms with and without bank involvement presents perhaps the primary challenge in evaluating the effects of financial system structure.

It is difficult to re-evaluate the evolution and impact of the German financial system in isolation; and, in any case, modern debates over banking deregulation in the United States, like historical debates over the alleged failures of the British banking systems, fundamentally imply a comparison between universal, relationship banking and specialized, arms-length systems. Thus, comparisons with other countries, both with and without universal banking systems, can help in placing the German experience in context while shedding light on the relative costs and benefits of different institutional structures. Research into this question must begin by establishing what constitutes proof that one system dominates the other. It is also essential to consider the possibility that financial institutions are tied to the political, legal, social, and cultural systems in which they exist and are therefore highly context sensitive.

The goal, from an historical perspective, is to determine whether countries with separated systems would have benefitted from universal and relationship banking and also whether countries that did import German-style banking did benefit. Two natural candidates for comparison are Britain and Italy. For the former, where the contrast with the German system is seen as the most stark, new comparisons of the growth and involvement of banks are particularly important. Bringing together the latest thinking on the British and German systems may turn up more similarities than differences in the ultimate effects of these systems. Recent research on British banks, for example, suggests that British banks played a more active and long-term role in industrial investment than has traditionally been believed and that German banks were less involved in direct equity participations in firms than the orthodox view holds.<sup>97</sup>

Likewise, newer work on Italy argues for a moderate interpretation of the role of the universal banks in that country's industrialization.<sup>98</sup> If orthodox views of universal banking are undermined similarly in two of the paradigm cases, and if the stark differentiation with the British system is softened, then the more general view of the importance of universal banking per se in spurring economic growth will be significantly qualified.

Such findings, however, are not necessarily antithetical to Gerschenkron's hypotheses. Gerschenkron's thesis does not imply that universal, relationship banking is always

---

<sup>97</sup>On the involvement of British bankers in industry see Capie and Collins (1992), Collins (1998), Cottrell (1980), Mathias (1973, 1989). See Fohlin (1997c) for a quantitative comparison of the British and German systems.

<sup>98</sup>See Confalonieri (1979, 1981) and Fohlin (1998a).

a superior system to specialized, arms-length systems. Indeed, in this view, the German style of financial intermediation developed as a response to shortcomings elsewhere in the economy particularly, a shortage of accumulated surpluses from previous years' production. Thus, universal banking may have been a second-best solution in cases in which the first-best was unattainable. An interesting implication of Gerschenkron's hypothesis about banking and relative backwardness is that economies that have developed fully can reduce their reliance on the institutions that developed to push industrialization. Thus, the characteristics of the German banks that are seen as so central to that country's industrialization should have become less important once Germany caught up to Britain after the turn of the twentieth century. In a sense, the German financial system should have become more similar to the British system once the two economies were on par in other respects. Here again, political and legal factors seem to play a crucial role.

Whether or not universal, relationship banking is especially suited to stimulate growth during industrialization, such a system may outlive its usefulness. Institutional sclerosis, however, may prevent adaptation to changes in the economy. From the historical accounts of universal banking's role in Germany, it is clear that economies of scale (and thus growing concentration) in the frontier industries of the late nineteenth century are linked closely to the structure of the financial system of that country. But if the long-term development of an economy is not linked to a particular industrial structure, and if financial institutions tend to become fossilized, then the net real effects of financial systems may vary over time. As Tilly notes, "...during [the interwar period], and particularly in the crisis of the 1930s, the superiority of the universal banking system as a means of financing industrial growth disappears."<sup>99</sup>

The fact that the German and British systems did not converge should lead researchers to wonder whether the Gerschenkron hypothesis helps us understand the role of universal banking in Germany or the possible role of similar institutions in modern economies. If there are significant long-term effects of the structure of financial systems, then the persistence of multiple systems needs to be rationalized. The fact that, in the absence of regulation dictating the form of financial institutions, Germany and Britain retain apparently different systems, suggests that the costs of switching are too high, that the welfare effects are not internalized by the institutions involved, or that the effects of institutional structure are small. Thus, even in the face of prolific research comparing financial systems, the possibility also must be considered that the systems are equivalent at a first-order approximation. We may find that the crucial condition for economic growth is the existence of some mechanism to mobilize resources for productive investment.

## V. CONCLUSIONS

Gerschenkron himself recognized that he could not answer the broader question, whether financial institutions are generally able to promote the kind of mobilization and efficient utilization of capital that is thought of as a prerequisite for industrial development.

---

<sup>99</sup>Tilly (1994), p. 5. Of course, this comment presupposes the superiority of the German system in the pre-war era.

Only recently has the economics literature made major progress on such questions, and much attention is focused on the importance of financial system design. At the same time, recent historical research offers mixed evidence on the potential benefits, and little insight into the costs, of universal banking systems.

In this light, the current paper argues that orthodox views of the importance of financial structure, and of the benefits of the universal, relationship system of banking in particular, require rethinking. As the primary example of the Gerschenkron hypothesis, Germany is of central significance. If the specific institutions that comprise universal and relationship banking cannot be shown to have resulted in higher quantities, productivity, or efficiency of investment at the firm level, then we are left to determine what other factors played a part in transforming Germany into a modern, industrial nation.

Despite substantial recent progress in understanding problems of financial system structure, we still need a combination of research on both the theoretical and empirical fronts: new evidence and re-evaluations of extant sources in order to better understand the development and role of financial systems, as well as theoretical advances that take into account the revised empirical record. In this regard, historical research is particularly important. First, much of the current structure of financial institutions originates in the institutions and systems of the nineteenth century. Understanding the past may therefore enrich our understanding of the present. Second, since each economic epoch presents different challenges for financial systems and economies, adding periods essentially increases the number of data points available. A broader range of cases permits greater generalization.

In addition, if empirical research more broadly fails to support current theoretical thinking, then a clearer understanding of the reasons for that failure is also needed. Thus, existing theories may require some adjustment if they are to prove useful for turning empirical research into forecasts or prescriptions. Neither theoretical nor historical research is motivated solely by the desire to offer practical insights into modern problems, but this paper argues that both strands of literature will benefit from increased influence of the other.



## References

- Allen, F. (1992), *Stock Markets and Resource Allocation in Capital Markets and Financial Intermediation*. Cambridge University Press.
- Allen, F. and A.M. Santomero (1998), "The Theory of Financial Intermediation." *Journal of Banking & Finance* **21**, 1461-1485.
- Baskin, J., and P.J. Miranti, Jr. (1997), *A History of Corporate Finance*. New York, NY: Cambridge University Press.
- Becht, M., and C. Ramirez (1993), "Finance Capitalism in Pre-World War I Germany: The Role of the Universal Banks in the Financing of German Mining Companies 1906-1912," mimeo, Harvard University.
- Benston, G. J. (1994), "Universal Banking." *Journal of Economic Perspectives* **8**, 121-143.
- Berglöf, E. (1997), "Reforming Corporate Governance: Redirecting the Europe and Agenda." In: *Boardrooms: Reforming Corporate Governance in Europe*. Oxford: Centre for Economic Policy Research.
- Bhattacharya, S., and A. Thakor (1993), "Contemporary Banking Theory." *Journal of Financial Intermediation* **3**, 2-50.
- Borchardt, K. (1968), "Staatsverbrauch und öffentliche Investitionen in Deutschland, 1780- 1850." (Unpubl. Ph.D. thesis, University of Göttingen).
- Boot, A.W.A. and A.V. Thakor (1997), "Banking Scope, Financial Innovation." *Review of Financial Studies* **10**, 1099-1131.
- Boot, A.W.A. and A.V. Thakor (1997), "Financial System Architecture." *Review of Financial Studies* **10**, 693-733.
- Bösselmann, K. (1939), *Die Entwicklung des deutschen Aktienwesens im 19. Jahrhundert*. Berlin, Germany: Walter De Gruyter & Co.
- Boyd, J. H., and E.C. Prescott (1986), "Financial Intermediary-Coalitions." *Journal of Economic Theory* **38**, 211-232.
- Boyd, J.H., and B.D. Smith (1994a), "Capital Market Imperfections, International Credit Markets, and Nonconvergence." *Journal of Economic Theory* **73**, 335-64.
- Boyd, J.H., and B.D. Smith (1995), "The Evolution of Debt and Equity Markets in Economic Development." Working paper No. 542, *Federal Reserve Bank of Minneapolis*.
- Boyd, J., and B. Smith (1996), "The Coevolution of the Real and Financial Sectors in the Growth Process." *The World Bank Economic Review* **10**, 371-396.

- Broadberry, S. (1997), "Anglo-German Productivity Differences 1870-1990: A Sectoral Analysis." *European Review of Economic History*, **1**, 247-267.
- Broder and Wengenroth, 1991, Chapter name. In V.I. Bovykin and R. Cameron (Eds.), *International Banking, 1870-1914*. New York: Oxford University Press.
- Calomiris, C., and C. Himmelberg (1993), "Directed Credit Programs for Agriculture and Industry: Arguments from Theory and Fact." *Proceedings of the World Bank Annual Conference on Development Economics*. Washington, D.C.: The World Bank.
- Calomiris, C. (1995), "The Costs of Rejecting Universal Banking: American Finance in the German Mirror, 1870-1914." In N. Lamoreaux and D. Raff (eds.). *Coordination and Information*. Chicago, IL: University of Chicago Press.
- Cameron, R.E. (1961), *France and the Economic Development of Europe*. Princeton: Princeton University Press.
- Cameron, R.E. (1967), *Banking in the Early Stages of Industrialization*. New York: Oxford University Press.
- Cameron, R. (1972), *Banking and Economic Development*. New York: Oxford University Press.
- Capie, F., and M. Collins (1992), *Have the Banks Failed British Industry?*. London: Institute of Economic Affairs.
- Chandler, A.D. (1990), *Scale and Scope: The Dynamics of Industrial Capitalism*. Cambridge, MA: The Belknap Press of Harvard University Press.
- Chemmanur, T.J., and Fulghieri, P. (1994). "Reputation, Renegotiation, and the Choice Between Bank Loans and Publicly Traded Debt," *Review of Financial Studies* **7**, 475-506.
- Chirinko, R. (1997), "Finance Constraints, Liquidity, and Investment Spending: Theoretical Restrictions and International Evidence." *Journal of the Japanese and International Economies* **11**, 185-207.
- Collins, M. (1989), "The Banking Crisis of 1878." *Economic History Review*, **42**, 504-527.
- Collins, M. (1991), *Banks and Industrial Finance in Britain 1800-1939*. London: MacMillan.
- Collins, M. (1998), "English Bank Development within a European Context, 1870-1939." *Economic History Review* **51**, 1-24.
- Cottrell, P. (1980), *Industrial Finance, 1830-1914: The Finance and Organization of English Manufacturing Industry*. London: Methuen.

- Confalonieri, A. (1979), *Banca E Industria in Italia 1894-1906*. Milano: Banca Commerciale Italiana. Vol. 2.
- Confalonieri, A. (1975), *Banca E Industria in Italia Dalla Crisi Del 1907 All'agosto 1914*. Milano: Banca Commerciale Italiana. Vol. 1.
- Craine, R.B. (1995), "Fairly Priced Deposit Insurance and Bank Charter Policy." Working paper, University of California Berkeley.
- Da Rin, M. (1996), "Understanding the Development of the German *Kreditbanken* 1850-1914: An Approach from the Economics of Information." *Financial History Review* **3**, 29-47.
- Deutsche Bundesbank, 1976, *Deutsches Geld- und Bankwesen in Zahlen, 1876-1975* Frankfurt: Deutsche Bundesbank.
- Dewatripont, M., and E. Maskin (1995), "Credit and Efficiency in Centralized and Decentralized Economies." *Review of Economic Studies* **62**, 542-555.
- Dewatripont, M., and E. Maskin (1990), "Contract Renegotiation in Models of Asymmetric Information." *European Economic Review* **34**, 311-321.
- Diamond, D. (1991), "Monitoring and Reputation: The Choice Between Bank Loans and Directly Placed Debt." *Journal of Political Economy* **99**, 689-721.
- Diamond, D. (1984), "Financial Intermediation and Delegated Monitoring." *Review of Economic Studies* **51**, 393-414.
- Donaubauer, K.A. (1988), *Privatbankiers und Bankenkonzentration in Deutschland von der Mitte des 19. Jahrhunderts bis 1932*. Frankfurt am Main: Fritz Knapp Verlag.
- Edwards, G.T. (1987), *The Role of Banks in Economic Development*. London: The Macmillian Press, Ltd.
- Edwards, J., and S. Ogilvie, (1996), "Universal Banks and German Industrialization: a Reappraisal." *Economic History Review* **49**, 427-446.
- Elston, J. (1998), "Investment, Liquidity Constraints and Bank Relationships: Evidence from German Manufacturing Firms." In S.W. Black and M. Moersch (eds.), *Competition and Convergence in Financial Markets: The German and Anglo-Saxon Models*. Amsterdam, The Netherlands: Elsevier Science Publishers.
- Fazzari, S.R., G. Hubbard, and B. Petersen (1988), "Investment and Finance Reconsidered." *Brookings Papers on Economic Activity* 141-195.
- Feldenkirchen, W. (1979), "Banken und stahlindustrie im Ruhrgebiet. Zur Entwicklung ihrer Beziehungen 1873-1914." In *Bankhistorisches Archiv, Bd. 2*. Frankfurt, Pp. 27-52.

- Feldenkirchen, W. (1979), "Kapitalbeschaffung in der Eisen- und Stahlindustrie des Ruhrgebiets." *Zeitschrift für Unternehmensgeschichte*, Vol. 24 Pp. 39-81.
- Feldenkirchen, W. (1991), "Banking and Economic Growth: Banks and Industry in the Nineteenth Century and their Changing Relationship During Industrialization." W.R. Lee (ed.). *German Industry and German Industrialisation*. London: Routledge. Pp. 116-147.
- Feldman, G. (1977), *Iron and Steel in the German Inflation, 1916-1923*. Princeton: Princeton University Press.
- Feldman, G.D. (1997), "Responses to Banking Concentration in Germany, 1900-1933." Mimeo, University of California Berkeley.
- Feldman, G.D. (1998), *Hugo Stinnes: Biographie eines Industriellen 1870-1924*. Munich: Verlag C.H. Beck.
- Fischer, W. (1968), *Wirtschafts- und sozialgeschichtliche Probleme der frühen Industrialisierung*. Berlin.
- Fohlin, C. (1994), "Financial Intermediation, Investment, and Industrial Development: Universal Banking in Germany and Italy from Unification to World War I." Dissertation, University of California Berkeley.
- Fohlin, C. (1997a), "The Universal banks and the Mobilization of Capital in Imperial Germany," Forthcoming in P. Cottrell, G. Feldman, & J. Reis (Eds.), *Finance & the Making of Modern Capitalism*, Aldershot, England: Scolar Press.
- Fohlin, C. (1997b), "Universal Banking Networks in Pre-War Germany: New Evidence from Company Financial Data." *Research in Economics* **51**, 201-225.
- Fohlin, C. (1997c), "Bank Structure and Growth: Insights from British and German Bank Balance Sheets Before World War I." Social Science Working Paper No. 1016, California Institute of Technology.
- Fohlin, C. (1997d), "The Rise of Interlocking Directorates in Imperial Germany." Social Science Working Paper No. 931, California Institute of Technology.
- Fohlin, C. (1997e), "Bank Securities Holdings and Industrial Finance Before World War I: Britain and Germany Compared" *Business and Economic History*, **26**, 463-475.
- Fohlin, C. (1998a), "*Fiduciari* and Firm Liquidity Constraints: The Italian Experience with German-Style Universal Banking." *Explorations in Economic History* **35**, 83-107.
- Fohlin, C. (1998b), "Relationship Banking, Liquidity, and Investment in the German Industrialization." *Journal of Finance*, forthcoming.
- Fohlin, C. (1998c), "Bank Oversight and the Capital Structure of German Firms." Social Science Working Paper No. 1030, California Institute of Technology.

- Fremdling, R. and R.H. Tilly (1976), "German Banks, German Growth and Econometric History." *Journal of Economic History*, **36**, 416-24.
- Friedrich, W. (1979), "Die Entwicklung des Rechts der bergrechtlichen Gewerkschaft in Preußen von 1850 bis zum Ersten Weltkrieg." In N. Horn and J. Kocka (eds.), *Recht und Entwicklung der Großunternehmen im 19. Und frühen 20. Jahrhundert*. Bielefeld, Germany: Göttingen, Vandenhoeck & Ruprecht.
- Fremdling, R. and R. Tilly (1979), "Industrialisierung und Raum. Studien zure regionalen Differenzierung im Deutschland des 19. Jahrhunderts." Stuttgart: Klett Cotta.
- Gale, D. and M. Hellwig (1985), "Incentive-Compatible Debt Contracts: The One-Period Problem." *Review of Economic Studies* **52**, 647-63.
- Galetovic, A. (1996), "Finance and Growth: A Synthesis and Interpretation of the Evidence." *BNL Quarterly Review* **196**, 59-82.
- Gerschenkron, A. (1962), *Economic Backwardness in Historical Perspective*. Cambridge, MA: Harvard University Press.
- Gerschenkron, A. (1968), "The Modernisation of Entrepreneurship." In: *Continuity in History and Other Essays*. Cambridge: Belknap Press of Harvard University Press. Pp. 128-39.
- Gerschenkron, A. (1970), *Europe in the Russian Mirror*. New York : Cambridge University Press.
- Gerschenkron, A. (1977), *An Economic Spurt that Failed*. Princeton: Princeton University Press.
- Greenwood, J. and B.D. Smith (1997), "Financial Markets in Development, and the Development of Financial Markets." *Journal of Economic Dynamics and Control* **21**, 145-181.
- Guinnane, T. (1994), "A failed Institutional Transplant: Raiffeisen's Credit Cooperatives in Ireland, 1894-1914." *Explorations in Economic History* **31**, 38-61.
- Guinnane, T. (1998), *Financial Intermediation for Poor People: The Development of Germany's Credit Cooperatives, 1850-1914*. Forthcoming. London: Cambridge Univ. Press.
- Goldsmith, R.W. (1985), *Comparative National Balance Sheets A Study of Twenty Countries, 1688-1978*. Chicago: University of Chicago Press.
- Gömmel, R. (1992), "Entstehung und Entwicklung der Effektenbörse im 19. Jahrhundert bis 1914." In H. Pohl (ed.), *Deutsche Börsengeschichte*. Frankfurt.
- Greenbaum, S., I.G. Kanatas, and I. Venezia (1989), "Equilibrium Loan Pricing Under the Bank-Client Relationship." *Journal of Banking and Finance* **13**, 221-235.

- Grossman, R.S. (1997), "Rearranging Deck Chairs on the Titanic: English banking concentration and efficiency, 1870-1914." Working paper, Wesleyan University.
- Harris, M., and Raviv, a. (1991). The Theory of Capital Structure, *Journal of Finance* **46**, 297-355.
- Hauswald, R.B.H. (1995), "On the Origins of Universal Banking: An Analysis of the German Banking Sector 1848 to 1910." Working paper. Department of Economics, Stanford University.
- Hellwig, M. (1991), "Banking, Financial Intermediation and Corporate Finance." In A. Giovannini and C. Mayer (eds.), *European Financial Integration*. New York: Cambridge University Press. Pp. 35-63.
- Hellwig, M. (1997), "Banks, Markets, and the Allocation of Risks in an Economy." Working paper No. 97-35, Universität Mannheim, Mannheim, Germany.
- Herrigel, G. (1996), *Industrial Constructions: The sources of German Industrial power*. London: Cambridge University Press.
- Hilferding, R. (1910), *Das Finanzkapital*, Vienna: Wiener Volksbuchhandlung [English translation: *Finance Capital*. In T. Bottomore (ed.). Boston: Routledge and Kegan Paul, 1981].
- Hommelhof, P. and W. Schubert (1984), *Hundert Jahre Modernes Aktienrecht. Eine Sammlung von Texten und Quellen zur Aktienrechtsreform 1884*. Berlin, NY.
- Horn, N. (1979), "Aktienrechtliche Unternehmensorganisation in der Hochindustrialisierung (1860-1920). Deutschland, England, Frankreich und die USA im Vergleich." In N. Horn and J. Kocka (eds.), *Recht und Entwicklung der Großunternehmen im 19. Und frühen 20. Jahrhundert*. Bielefeld, Germany: Göttingen, Vandenhoeck & Ruprecht.
- Horn, N. and J. Kocka (1979), *Recht und Entwicklung der Großunternehmen im 19. Und frühen 20. Jahrhundert*. Bielefeld, Germany: Göttingen, Vandenhoeck & Ruprecht.
- Hoshi, T., A. Kashyap, and D. Scharfstein (1991), "Corporate Structure, Liquidity, and Investment." *Quarterly Journal of Economics* **106**, 33-60.
- James, C. and P. Wier (1990), "Borrowing Relationships, Intermediation and the Cost of Issuing Public Securities." *Journal of Financial Economics* **28**, 149-171.
- James, H. (1992), "Banks and Economic Development: Comments'." In Y. Cassis, (ed.), *Finance and financiers in European history, 1880-1960*. Cambridge. Pp. 113-8.
- Japelli, T. and M. Pagano (1994), "Saving, Growth, and Liquidity Constraints." *The Quarterly Journal of Economics* **109**, 83-109.

- Jayaratne, J. and P.E. Strahan (1996), "The Finance-Growth Nexus: Evidence from Bank Branch Deregulation." *The Quarterly Journal of Economics* **111**, 639-670.
- Jeidels, O. (1905), *Das Verhältnis der Deutschen Großbanken zur Industrie*. Leipzig: Duncker und Humblot.
- Jensen, M. and W. Meckling (1976), "The Theory of the Firm: Managerial Behavior, Agency Costs, and Ownership Structure." *Journal of Financial Economics* **3**, 305-60.
- Kaplan, S.N. and L. Zingales (1997), "Do Investment-Cash Flow Sensitivities Provide Useful Measures of Financing Constraints?" *Quarterly Journal of Economics* **112**, 168-215.
- Kennedy, W.P. and R. Britton (1985), "Portfolioverhalten und wirtschaftliche Entwicklung im späten 19. Jahrhundert. Ein Vergleich zwischen Großbritannien und Deutschland. Hypothesen und Spekulationen. In R. Tilly, (Ed.) *Beiträge zur quantitativen vergleichenden Unternehmensgeschichte*. Stuttgart.
- Kennedy, W.P. (1987), *Industrial Structure, Capital Markets and the Origins of British Economic Decline*. London: Cambridge University Press.
- Kennedy, W.P. (1992), "Historical Patterns of Finance in Great Britain: A Long-Run View." In V. Zamagni (ed.), *Finance and the Enterprise*. London: Academic Press.
- Kindleberger, C.P. (1984), *A Financial History of Western Europe*. London: George Allen and Unwin.
- Kindelberger, C.P. (1984), "Financial Institutions and Economic Development: A Comparison of Great Britain and France in the Eighteenth and Nineteenth Centuries," *Explorations in Economic History* **21**, 103-24
- King, R.G. and R. Levine (1993), "Finance and Growth: Schumpeter Might be Right," *The Quarterly Journal of Economics* **108**, 717-737.
- Kocka, J. (1978), "Entrepreneurs and Managers in German Industrialisation." In P. Mathias and M.M. Postan (eds.) *The Cambridge Economic History of Europe, The industrial Economies: Capital Labor and Enterprise. Part One: Britain, France, Germany, and Scandinavia*. Cambridge, MA: Cambridge University Press. Vol. 7.
- Kocka, J. (1980), "The Rise of Modern Industrial Enterprise in Germany." In Chandler, A.D., Jr. and H.D. Chandler (eds.). *Managerial Hierarchies: Comparative Perspectives on the Rise of Modern Industrial Enterprise*. Cambridge, MA: Harvard University Press.
- Komlos, J. (1978), "The Kreditbanken and German Growth: A Postscript." *Journal of Economic History* **38**, 476-79.

- Krosner, R. and R. Rajan (1994), "Is the Glass Steagall Act Justified? A Study of the US Experience with Universal Banking Before 1933." *American Economic Review* **84**, 810-832.
- Kunze, W. (1926), *Der Aufbau des Phoenix-Konzerns*. Frankfurt.
- Lavington, F.E. (1921), *The English Capital Market*. London: Methuen.
- Levine, R. (1993), "Financial Development and Economic Growth: Views and Agenda." *Journal of Economic Literature* **35**, 688-726.
- Lévy-Leboyer, M. (1964), *Les Banques Europeennes et l'industrialisation internationale dans la première moitié du XIX siècle*. Presses Universitaires de France: Paris.
- Lucas, R.E., Jr. (1988), "On the Mechanics of Economic Development." *Journal of Monetary Economics* **22**, 3-42.
- März, E. (1968), *Österreichische Industrie- und bankpolitik in der Zeit Franz Josephs I.* Frankfurt.
- Mathias, P. (1973), "Capital, Credit, and Enterprise in the Industrial Revolution." *Journal of European Economic History* **2**, 121-143.
- Mathias, P. (1989), "Financing the Industrial Revolution." In P. Mathias and J.A. Davis (eds.), *The First Industrial Revolutions*. Oxford: Basil Blackwell. Pp. 69-85.
- Mayer, C. (1988), "New Issues in Corporate Finance." *European Economic Review* **32**, 1167-88.
- Megerle, K. (1979), "Regionale differenzierung des industrialisierungsprozesses: Überlegungen am Beispiel Württembergs." In U. Fremdling and R.H. Tilly (eds.), *Historisch-Sozialwissenschaftliche Forschungen: Quantitative sozialwissenschaftliche Analysen von Historischen und prozeß-produzierten Daten*. Klett-Cotta.
- Meier, J.C. (1992), *Die Entstehung des Börsengesetzes vom. 22, Juni 1896*. Studien zur Wirtschafts- und Sozialgeschichte, Vol. 9. St . Katharinen.
- Myers, S. and N. Majluf (1984), "Corporate Financing and Investment Decisions when Firms Have Information that Investors Do Not Have." *Journal of Financial Economics* **13**, 187-221.
- Narayanan (1989)
- Neal, L. (1998), "The Importance of Legal and Political Environments for Financial Intermediation: The Historical Example of the First Emerging Markets." Paper presented at University of Southern California.
- Neuberger, H. and H. Stokes (1974), "German Banks and German Growth 1883-1913: An Empirical View." *Journal of Economic History* **34**, 710-31.



- Neymarck, A. (1910), *French Savings and their Influence Upon the bank of France and Upon French Banks*. Washington.
- Pagano, M. (1993), "Financial Markets and Growth: An Overview." *European Economic Review* **37**, 613-622.
- Peters, S.R. and A.V. Thakor (1995), "A Rationale for the Functional Separation of Qualitative Asset Transformation Services in Banking." Working paper, Indiana University.
- Petersen, B. and R. Rajan, (1994), "The Benefits of Lending Relationships: Evidence from Small Business Data." *Journal of Finance* **49**, 3-37.
- Pohl, M. (1982), *Konzentration in deutschen bankwesen, 1848-1980*. Frankfurt.
- Pohl, H. (1986), *Gewerbe- und Industrielandschaften vom Spätmittelalter bis ins 20. Jahrhundert*. [Ed.: Zeitschrift für Beiheft Nr. 78]. Stuttgart: Franz Steiner Verlag.
- Pollard, S. (1979), *Regionen und Industrialisierung..* Göttingen: Vandenhoeck & Ruprecht.
- Pollard, S. and D. Ziegler (1992), "Banking and Industrialization: Rondo Cameron twenty years on." Y. Casis (ed.), in *Finance and Financiers in European History, 1880-1960*, New York: Cambridge University Press. Chap. 2.
- Rajan, R. (1992), "Insiders and Outsiders: The Choice Between Informed and Arm's Length Debt." *Journal of Finance* **XLVII**, 1367-1400.
- Rajan, R. (1995), "The Entry of Commercial Banks in the Securities Business: A Selective Survey of Theory and Evidence." Paper presented at the conference on Universal Banking held at the Solomon Center at New York University.
- Rajan, R.G. and L. Zingales (1997), "Financial Dependence and Growth." University of Chicago & NBER.
- Reich, N. (1979), "Auswirkungen der deutschen Aktienrechtsreform von 1884 auf die Konzentration der deutschen Wirtschaft." In N. Horn and J. Kocka (eds.), *Recht und Entwicklung der Grossunternehmen im 19. Und frühen 20. Jahrhundert*, (Göttingen). Pp. 257-263.
- Rettig, R. (1978), "Das Investitions- und Finanzierungsverhalten deutscher Großunternehmen, 1880-1911." Dissertation, University of Münster.
- Riesser, J. (1910), *Die deutschen Großbanken und ihre Konzentration*, Jena: Verlag von Gustav Fischer. [English translation: *The German Great Banks and their Concentration*. Published by The National Monetary Commission (Washington: Government Printing Office), 1911].
- Schulte, W. (1994), *Das deutsche Börsengesetz. Die Entstehungsgeschichte und wirtschaftlichen Auswirkungen des Börsengesetzes von 1896*. Frankfurt.

- Schumpeter, J.A. (1936), *Theory of Economic Development*. 2nd edition. Cambridge: Harvard University Press.
- Schumpeter, J.A. (1939), *Business Cycles: A Theoretical, Historical, and Statistical Analysis of the Capitalist Process*. New York: McGraw-Hill, 1st edition.
- Sharpe, S. (1990), "Asymmetric Information, Bank Lending, and Implicit Contracts: A Stylized Model of Customer Relationships," *Journal of Finance* **45**, 1069-1087.
- Sombart, W. (1909, 1913), *Die Deutsche Volkswirtschaft im Neunzehnten Jahrhundert*. Second and third editions, Berlin: Georg Bondi.
- Stein, J.C. (1989), "Efficient Capital Markets, Inefficient Firms: A Model of Myopic Corporate Behavior." *Quarterly Journal of Economics* **104**, 655-669.
- Stiglitz, J.E. and A. Weiss, A. (1981), "Credit Rationing in Markets with Imperfect Information." *American Economic Review* **71**, 393-410.
- Stiglitz, J.E. (1985), "Credit Markets and the Control of Capital." *Journal of Money, Credit and Banking* **17**, 133-52.
- Sylla, R.E. (1991), "The Role of Banks." In G. Toniolo and G. Federico (eds.), *Patterns of European Industrialization: The Nineteenth Century*. New York: Routledge.
- Thakor, A.V. (1996), "Capital Requirements, Monetary Policy, and Aggregate Bank Lending: Theory and Empirical Evidence." *Journal of Finance* **51**, 279-324.
- Thakor, A.V. (1996), "The Design of Financial Systems: An Overview." *Journal of Banking & Finance* **20**, 917-948.
- Thieme, H. (1960), "Statistische Materialien zur Konzessionierung von Aktiengesellschaften in Preussen bis 1867." *Jahrbuch für Wirtschaftsgeschichte*. Part 2.
- Tilly, R. (1966), *Financial Institutions and Industrialization in the Rhineland, 1815-1870*. Madison, Wisconsin.
- Tilly, R. (1967), "Germany, 1815-1870." In R. Cameron (ed.), *Banking in the Early Stages of Industrialization: A Study in Comparative Economic History*. New York: Oxford University Press.
- Tilly, R. (1986), "Germany Banking, 1850-1914: Development Assistance for the Strong." *Journal of European Economic History* **15**, 113-152.
- Tilly, R. (1992), "An Overview of the Role of the Large German Banks up to 1914." In Y. Cassis (ed.), *Finance and Financiers in European History 1880-1960*. London: Cambridge University Press.
- Tilly, R. (1994a), "German Banks and Foreign Investment in Central and Eastern Europe before 1939." In D. Good (ed.), *Economic Transformations in East and Central Europe*. London and New York.

- Tilly, R. (1994b), "Banks and Industry: Lessons from History." Paper presented at *European Economic Integration as a Challenge to Industry and Government*. Münster, Germany.
- Tilly, R. (1995), "The Berlin Securities Exchange in National Context: Actors, Rules and Reforms 1914." Working paper, University of Münster, Germany.
- Tilly, R. (1997), "Universal Banking in Historical Perspective." Paper presented in Wallerfangen, Germany.
- Tipton, F.B., Jr. (1976), *Regional Variations in the Economic Development of Germany during the Nineteenth Century*. Middletown, CT: Wesleyan University Press.
- Townsend, R. (1979), "Optimal Contracts and Competitive Markets with Costly State Verification." *Journal of Economic Theory* **21**, 265-93.
- Verdier, T. (1997), "The Political Origins of Banking Structures." *Policy History Newsletter* **2**.
- von Thadden E.L. (1990), "Bank Finance and Long-Term Investment." WWZ Discussion Paper 9010, University of Basel.
- von Thadden, E.L. (1995), "Long-term Contracts, Short-term Investment and Monitoring." *Review of Economic Studies* **62**, 557-575.
- Wallich, P. (1905), *Die Konzentration im deutschen Bankwesen*, Stuttgart: Union deutsche Verlagsgesellschaft.
- Watson, K. (1995), "The New Issue Market as a Source of Finance for the UK Brewing and Iron and Stetel Industries, 1870-1913," in Y. Cassis, G. Feldman, and U. Olsson (eds.), *The Evolution of Financial Institutions and Markets in Twentieth-Century Europe*. Aldershot, England: Scolar Press.
- Wengenroth, U. (1986), *Unternehmensstrategien und technischer Fortschritt. Die deutsche und britische Stahlindustrie 1865-1895*. Göttingen.
- Weinstein, D. and Y. Yafeh (1995), "On the Costs of a bank centered financial system: Evidence from the changing main bank relations in Japan." mimeo, Harvard University.
- Wessel, H.A. (1990), "Finanzierungsprobleme in der Gründungs- und Ausbauphase der Deutsch-Österreichischen Mannesmannröhrenwerke A.G. 1890-1907." In D. Petzina (ed.), *Zur Geschichte der Unternehmensfinanzierung*. Berlin (Schriften des Vereins für Sozialpolitik, Vol. 196).
- Whale, P.B. (1930), *Joint-Stock Banking in Germany*. London: MacMillan and Co.
- White, E.N. (1986), "Before the Glass-Steagall Act: An Analysis of of the Investment Banking Activities of National Banks." *Explorations in Economic History* **23**, 33-55.

- Wellhöner, V. 1989, *Grossbanken und Grossindustrie im Kaiserreich*, Göttingen: Vandenhoeck- Ruprecht.
- Wilson, P. (1994), "Public Ownership, Delegated Project Selection and Corporate Financial Policy." Working paper, Indiana University.
- Zamagani, V. (1993), *The Economic History of Italy 1860-1990*. Oxford: Clarendon Press.
- Ziegler, D. (1993), "Zentralbankpolitische "Steinzeit? Preußische bank und bank of England im Vergleich." In *Geschichte und Gesellschaft*.